

# Opportunities and limitations of BPM initiatives in public administrations across levels and institutions

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*To Katja and Charlott.*



## Abstract

Business Process Management (BPM) is already widely used in the private sector. The importance of knowledge management and BPM in the public administration also increases due to the advancing demographic change, the increasing cost pressures, the consequent lack of resources as well as the increased demand of customers for administrative services. Despite a uniform legal framework, the business processes are executed differently in different administrations. There is little exchange of expertise and experience between BPM projects. However, collaboration and exchange are the most efficient drivers for optimization and savings.

The goal of the research project “National Process Library”<sup>1</sup> (NPL) is to create a platform to exchange and reuse processes and BPM expertise about and among German administrations. For the dissertation at hand, essential design elements of this platform have been designed and have been subject to a first evaluation (chapter 3).

Many findings about the successful implementation of process management in the private sector cannot be directly transferred to the public administration, as there exist important differences. First, traditional process reengineering approaches cannot be applied in public administrations due to legal and political conditions. Second, the wide range of services, which are typically offered by public administrations represent a particular challenge in this context. Hence, the second contribution (chapter 4) focuses on the different implementation strategies of BPM in public administrations in Europe. We compared the approaches to business process management in the public administration of three countries, namely Germany, Switzerland, and Austria. The goal of this contribution is to identify successful implementation strategies.

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<sup>1</sup> In German: „*Nationale Prozessbibliothek*“

The current degree of implementation and maturity of BPM in public administrations is generally low. Many administrations face similar challenges and offer identical or overlapping services. However, the willingness to share knowledge about business processes is very limited. Therefore, the exchange of process knowledge could lead to immense savings. The third contribution (chapter 5) investigates the circumstances, drives and inhibitors to improve process knowledge sharing in public organizations.

The last contribution (chapter 6) represents the essential components of a federal information management in the public administration in Germany. The derived framework combines and integrates data and information from the areas of services, processes and forms of public administrations. To this end, we identify the essential relationships and effects of these areas on the administrative action. The framework takes into account the information needs outside of the administration (citizens and private sector) and within the administration, which represents content and interaction. We also examine to which extent such a structure can be further defined on a more detailed level and implemented.

Keywords:

Business process management, knowledge sharing, public administration public organizations, “National Process Library”, Federal Information Management, Success factors

## **Zusammenfassung**

In der Privatwirtschaft ist Geschäftsprozessmanagement (GPM) mittlerweile verbreitete und gängige Praxis. Mit den stärker wirkenden demografischen Veränderungen, dem zunehmenden Kostendruck, dem daraus folgenden Ressourcenmangel sowie den gestiegenen Dienstleistungsansprüchen der Verwaltungskunden nimmt die Bedeutung von Wissensmanagement und GPM auch in der öffentlichen Verwaltung zu. Trotz eines größtenteils einheitlichen Gesetzesrahmens werden in der Verwaltung Geschäftsprozesse unterschiedlich ausgestaltet. Zwischen Projekten, die Verwaltungsprozesse zum Gegenstand haben, gibt es zu wenig Austausch von Expertise und Erfahrungen. In Kollaboration und Austausch liegen jedoch die größten Optimierungs- und Einsparpotentiale.

Um das Wissen zum GPM in der Verwaltung aufzubauen, den Austausch zu fördern, Geschäftsprozesse und Expertise sichtbar und für andere Verwaltungsorganisationen wiederverwendbar zu machen, wurde im Forschungsprojekt Nationale Prozessbibliothek (NPB) eine Prozess- und Kollaborationsplattform zum GPM für die deutsche Verwaltung entwickelt. Im Rahmen der Forschungsarbeit wurden wesentliche Design-Elemente dieser Plattform entworfen und einer ersten Evaluation unterworfen.

Die Erkenntnisse aus der erfolgreichen Umsetzung von Prozessmanagement in der Privatwirtschaft sind nicht ohne weiteres in die Verwaltungspraxis übertragbar. So können traditionelle Prozess-Reengineering-Ansätze aufgrund der rechtlichen und politischen Rahmenbedingungen nicht angewendet werden. Auch die breite Palette von Dienstleistungen, die in der Regel von der öffentlichen Hand angeboten werden, stellt eine besondere Herausforderung in diesem Zusammenhang dar. Daher widmen wir uns in einem zweiten Beitrag verschiedenen Umsetzungsstrategien von GPM in der öffentlichen Verwaltung in Europa. Wir verglichen die Ansätze für Geschäftsprozessmanagement in der öffentlichen Verwaltung in den Ländern Deutschland, Schweiz und Österreich. Das Ziel dieses Beitrags ist es, Erkenntnisse zu erlangen, welche Strategien am ehesten zum Erfolg führen können.

Vor dem Hintergrund der derzeitigen Implementierung bzw. des Reifegrads von GPM in einzelnen Verwaltungen ist GPM längst kein integraler Bestandteil der Organisationen. Insbesondere ist die Bereitschaft, Wissen über Geschäftsprozesse zu teilen, ist sehr begrenzt. In Anbetracht der Tatsache, dass eine Vielzahl von Behörden gleiche Aufgaben haben bzw. sich die bereitgestellten Dienstleistungen überschneiden, liegen hier erhebliche Optimierungspotenziale brach. Wir untersuchen in einem weiteren Beitrag, welche Umstände, Treiber und Hemmnissen den Prozesswissens-Austausch in öffentlichen Organisationen beeinflussen.

In einem abschließenden Beitrag stellen wir die wesentlichen Bausteine eines föderalen Informationsmanagements in der öffentlichen Verwaltung in Deutschland dar. Dabei haben wir untersucht, wie Daten und Informationen aus den Bereichen Leistungen, Prozesse und Formulare der öffentlichen Verwaltung miteinander zu kombinieren und zu integrieren sind. Wir zeigen die wesentliche Zusammenhänge und die Wirkungen auf das Verwaltungshandeln auf. Ausgehend von den Informationsbedürfnissen außerhalb (Bürger und Wirtschaft) und innerhalb der Verwaltung haben wir ein Framework entwickelt, welches Inhalte und Zusammenwirken darstellt. Letztlich sind wir auch der Frage nachgegangen, über welche Detailierungs- und Ausbaustufen eine solche Struktur sukzessive verfeinert und implementiert werden kann.

Schlagwörter:

Geschäftsprozessmanagement, Wissensteilung, Öffentliche Verwaltung, eGovernment, Interoperabilität, Nationale Prozessbibliothek, Föderales Informationsmanagement, Erfolgsfaktoren



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## Abbreviations

BPM	Business Process Management
BPMN	Business Process Modeling Notation
DMS	Document Management System
eCH	eCH is an association and a platform for the promotion of e-government standards in Switzerland.
eEPC	Extended Event-Driven Process Chain
EPC	Event-Driven Process Chain
FaMoS	Domain Modeling Standard ( <i>Fachmodellierungsstandard</i> )
FIM	Federal Information Management
G2B	Government to Business
G2C	Government to Citizen
G2G	Government to Government
GIS	Geographic Information Systems
KGSt	Municipal Association for Public Management ( <i>Kommunale Gemeinschaftsstelle für Verwaltungsmanagement</i> )
KoSIT	Coordination Office for IT standards in Public Administration in Germany ( <i>Koordinierungsstelle für IT-Standards</i> )
LeiKa	Service Catalogue of the Public Administration ( <i>Leistungskatalog der Öffentlichen Verwaltung</i> )

NPL	“National Process Library” (“ <i>Nationale Prozessbibliothek</i> ”)
OGD	Open Government Data
ÖPP	Public Private Partnership
PC	Personal Computer
UML	Unified Modeling Language
XML	Extensible Markup Language
XÖV	XML in public administrations ( <i>XML in der Öffentlichen Verwaltung</i> )
XProcess	XÖV exchange Standard for process meta information





# 1. Introduction

## 1.1 Motivation

Process management is becoming increasingly important for the public administration [1-5]. The citizens and the private sector expect the administration to deliver high quality services spending little resources, the accessibility of the administration by electronic means and the electronic execution of services in the future [2, 6, 7]. However, in order to meet these expectations, the administrative processes have to be considered in their entirety [3, 8-12]. Therefore, it is not sufficient to make information available electronically [7, 13]. The entire process, from the front-end for the service recipient to the backend has to be aligned to the offered service and ideally execute it entirely electronically for the customer of administrative services [10, 11, 14-16].

Functional administrative action consists of externally oriented processes (core processes), managerial and support processes [17], which are linked to specific resources<sup>2</sup> and are nearly identical across institutions and levels. Therefore, there is a major efficiency potential. Ten percent of the employees off all German administrations or considering the municipalities with their more than 11,000 administrative entities about 21%<sup>3</sup> of all employees are concerned. In order to achieve efficiency improvements, work processes have to be optimized, information and knowledge of the administrations have to be visualized and made available [18, 19]. The common and comprehensive understanding of administrative processes are expected to create the necessary transparency and will lead in the long run to harmonization of administrative procedures and corresponding efficiency gains [1, 9, 20, 21].

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<sup>2</sup> <https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/OeffentlicheFinanzenSteuern/OeffentlicherDienst/Personal/Tabellen/Aufgaben.html>; accessed on October 27, 2013

<sup>3</sup> *ibid.*

A significant contribution to these efficiency gains in process management can be achieved through networking [22-26] of the various administrative entities and also across administrative levels<sup>4</sup>. The dissertation at hand discusses selected aspects of this process knowledge networking.

## **1.2 Contributions**

This cumulative dissertation comprises studies in the field of IS design science and behavioral research. The contributions can be summarized as follows.

First, we examine which functions and which type of content should be included in a platform in order to facilitate the implementation of BPM in the public administration. Based on the NPL framework, we develop a proposal for an exchange standard allowing the connection of different BPM platforms. Furthermore, we develop a proposal for a system architecture of the NPL. Last, we present various revenue models for the operation and maintenance of such a platform.

Public administrations in Europe are at an early stage of BPM implementation. Therefore, we compare the approaches for BPM implementation in Germany, Austria and Switzerland based on common criteria. The comparison provides first insights on how BPM can and should be introduced into the public administration and which strategies are promising. We show that it is necessary for the full exploitation of the potential of BPM implementations, to provide opportunities for the exchange of process knowledge and experiences.

Third, we show which circumstances, drivers and inhibitors influence the exchange of process knowledge in public administrations and develop a conceptual framework. This framework gives insights on how to deal with the limited willingness to share process knowledge in public administrations. We find that the factors trust, decision structure,

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<sup>4</sup> This aspect is examined in the research and development project “National Process Library” which is funded by the Federal Ministry of Interior, from which the essential topics of this dissertation emerged.

incentives and IT utilization have a significant impact on the willingness to share knowledge. We show that individuals fear to reveal their limited knowledge and to be criticized and are therefore reluctant to share their knowledge.

Lastly, we develop a conception for linking process information with general service specifications and form data. In particular, we investigate how to combine and to integrate data and information from the areas of services, processes and forms of public administrations. Moreover, we identify the essential correlations and their effects on administrative action. We show the necessary steps for developing the single components of a FIM.

The previously discussed contributions stem from several peer-reviewed publications. Chapter three to six are based on the following papers:

- 1) Ahrend, N., Walser, K., Leopold, H.: Comparative Analysis of the Implementation of Business Process Management in Public Administration in Germany and Switzerland. In: PoEM (Short Papers). PoEM (2012)
- 2) Eid-Sabbagh, R.-H., Ahrend, N.: Eine Prozessplattform für die deutsche Verwaltung. Workshop über Geschäftsprozessmanagement im öffentlichen Sektor, Informatik (2013)
- 3) Ahrend, N., Walser, K., Leopold, H.: Case Study of the Implementation of Business Process Management in Public Administration in Germany, Switzerland and Austria. ECEG (2013)
- 4) Ahrend, N., Leopold, H., Pittke, F.: Barriers and strategies of process knowledge sharing in public sector organizations. MKWI (2014)
- 5) Ahrend, N., Wolf, P., Räckers, M., Dentshev, A., Jurisch, M.: Federal Information Management – Context and Effects. FTVI (2014), submission scheduled for IFIP EGOV 2014

### 1.3 Methodological overview

The methodology of information system (IS) research is typically interdisciplinary and based on different theories [27, 28]. Yet, two complementary research paradigms are prevailing, design science and behavioral science [29, 30]. On the one hand, the development of innovative IS artifacts such as constructs, methods or instantiations is based on the design science paradigm [31-33]. On the other hand, the paradigm of behavioral research is used for the development and testing of theories which aim at explaining the behavior of humans interacting with IT systems [29]. Both paradigms are interleaved. IS artifacts influence human behavior, the prediction of human behavior, the expression of artifacts or functions, user interfaces and IS content [29]. We use both paradigms for the dissertation at hand. We develop IS artifacts by means of design science and we then evaluate them by means of behavioral methods. Table 1 gives an overview of the methods and the prevailing paradigms used for the dissertation at hand. In the following, we explain in detail the research methods used to answer the research question for each chapter.

**Tab. 1:** Overview of methods used in this dissertation

Chapter	Paradigm	Data Collection	Empirical Method	Data Analysis
3	Design science	Survey	Quantitative	Descriptive statistics
4	Behavioural Science	Interviews	Qualitative	Descriptive statistics
5	Behavioural Science	Interviews	Qualitative	Descriptive statistics, Grounded Theory
6	Design science	Interviews	Qualitative	

In Chapter 3, we discuss the basic design of a process exchange platform for public administrations. More specifically, we conceive the functionalities of such a platform, design an exchange standard for the connection with other platforms and BPM tools, and develop first steps towards a business model. For the development of the artifact, we

carefully build on the design science research guidelines proposed by Hevner [29]. Hence, we develop the artifact according to design science guideline 1 [29], and then evaluate it according to design science guideline 3 [29, 31, 32] with selected pilot users. It should be noted that the prototype is not yet operational, and that an extended evaluation with a large user cohort is still necessary. While this represents a limitation of our study, we aim at conducting a deeper evaluation according to design science guideline 6 [29] in future work.

Currently, there is little research on BPM implementations in public administrations available [4]. Therefore, Chapter 4 presents a comparison of the degree of BPM implementation in Germany, Switzerland and Austria. This study is based on a multiple case study design [34]. Its goal was to generate insights about the BPM implementation in public administrations and to identify corresponding success factors. In order to accomplish this goal, we first define criteria for the comparative analysis. We then conduct the interviews in the three countries. In each country, we interview employees from different positions to avoid biases due to a particular perspective. For the data analysis, we use qualitative content analysis as described in [35].

In Chapter 5, we examine the process of knowledge sharing in public administrations because only knowledge sharing and not the process thereof was discussed in previous research (e.g. in [25, 36-39]). To this end, we conduct a qualitative study. To analyse the generated data, we used the Grounded Theory method, which was introduced by Glaser and Strauss. The fundamental idea of this method is to inductively derivate theories that are grounded in the data [40]. Grounded Theory is suitable for phenomena for which little research has been conducted. For our study, we conduct semi-structured and in-depth interview with participants from different administrative levels, analyse the data using the Grounded Theory approach of Strauss and Corbin [41-44] and subsequently derive a theoretical framework.

In Chapter 6, we present the three components of the FIM and their interaction, which are based on the integration of BPM in the broader context of an information management in the public administration. We answer the following research questions:

- Which information in a FIM is required?
- Which relationships and dependencies between the components exist?
- Who provides which information in which way during the operation of a FIM?
- How can a structure be examined, gradually be refined and integrated?
- What are the benefits of FIM?

From a methodological perspective, this research is based on the paradigm of design science, which has recently been predominantly discussed based on Hevner et al. [28-30]. Our findings from which we derived the model and the individual artifacts are mainly based on interviews. The presented FIM model is the result of a one-year discussion process (guideline 6 in [29]).

#### 1.4 Structure of the dissertation

The dissertation at hand consists of six chapters based on publications as presented in chapter 1.2. First, we present the motivation for this thesis and explain the fundamental design questions for a BPM platform with the purpose to exchange processes and knowledge across institutions and levels. Second, we investigate the legal and organizational conditions required for a successful BPM implementation in the public administration in various countries and determine which of those are suitable to be transferred to Germany. Third, we investigate the drivers and inhibitors influencing the BPM implementation in German administrations. Last, we investigate how to realize an information management in the public administration across institutions and levels.

- In the **first chapter**, we explain the motivation for this dissertation and present related work and the underlying research paradigms and methodologies.
- The **second chapter** gives an overview of Business Process Management and the specifics of BPM implementation in the public administration.

- In the **third chapter** “A process library for the German administration”, we examine the design of the NPL platform. To this end, we identify the most important functions, we develop a functional framework as a basis for the exchange standard XProcess, and we define the system architecture. Further, we conduct a first evaluation concerning the importance of the offered functions and the usability of the NPL platform. Last, in the first chapter we present first ideas for a sustainable business model for the NPL respecting the legal and organisational framework-conditions in the public administration in Germany.
- In the **forth chapter** “BPM in Public Administration in Germany, Switzerland and Austria - Case Study”, we compare the framework conditions and approaches for the implementation of BPM in the public administration across three different countries. In particular, we examine how these countries handle process management. The goal of this chapter is to provide insights on how process management can successfully be introduced in public administrations.
- In **chapter five** “Barriers and strategies of process knowledge sharing”, we develop a conceptual framework for process knowledge sharing. We investigate the circumstances as well as drivers and inhibitors to improve process knowledge sharing in public organizations.
- In **chapter six** “Federal Information Management – Context and Effects”, we present the fundamental components of federal information management and process information in the German public administration. We describe the fundamental relationships between the components services, processes and forms. Further, we present the consequences from the interaction of these components on the administration action.
- The **last chapter** resumes the main findings of the dissertation at hand and gives an outlook on future research.



## **2. Business Process Management**

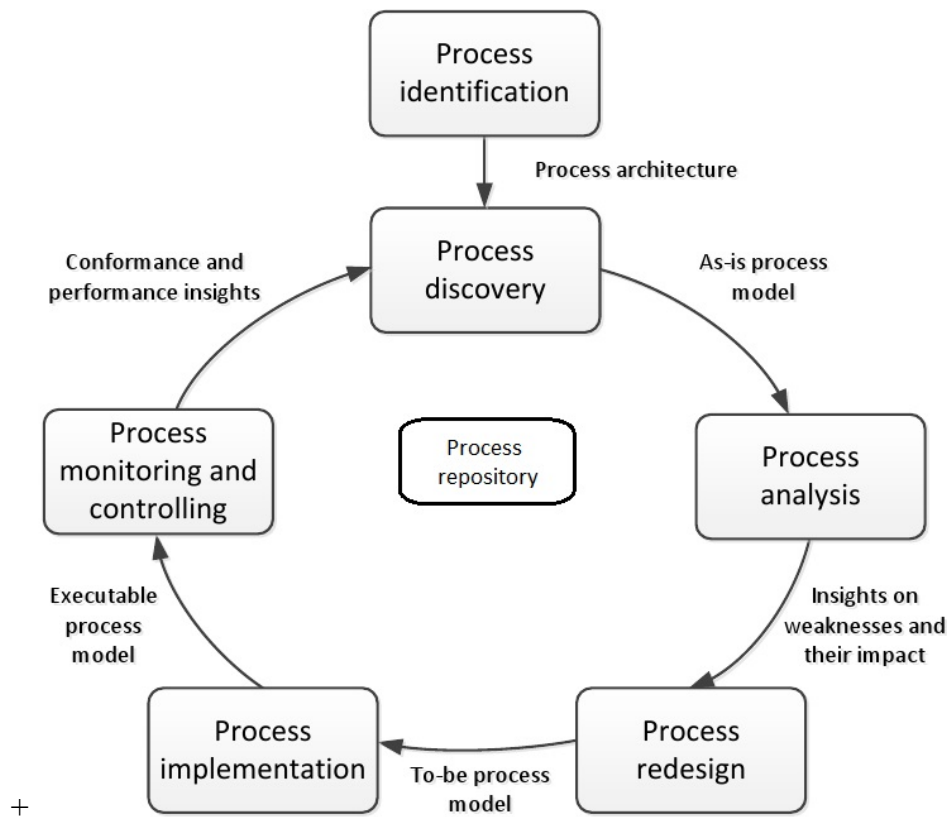
### **2.1 BPM Life Cycle**

The relevance of BPM is widely recognized in organizations as well as in research. However, many different approaches have been introduced. The introduction of standardized processes and their automated execution in the private sector has a long history. Henry Ford introduced as early as 1913 process-oriented concepts (assembly line) in the automotive industry, which led to a significant reduction of production times [45]. In the 1930s, Nordsieck was one of the first authors to describe the need for organizations to be process-oriented [46]. Then, first efforts were made to improve the processes. The KAIZEN concept introduced in 1992 combined the improvement of different aspects: quality, production planning, costs and customer orientation [47]. Meanwhile, this approach is also referred to as “Continuous Improvement Process”. Business Process Reengineering [48] describes a very comprehensive approach to renew business processes and the business organization. It involves the fundamental rethinking and radical redesign of key business processes. As a result, improvements in measurable performance measures in the areas of cost, quality, service and time can be achieved [49]. In the 1980s, standardized processes prevailed through the establishment of reference processes for ERP functions in the industry and subsequently in the service sector [50]. The publication of the international standard ISO 9001 for quality management in 1994 was another step forward for the process management [51].

All these approaches focus on the process as a system of interaction of activities and input values. In this respect, business process management can be understood as a set of concepts, methods and techniques that are used in the design, administration, configuration and analysis of processes [52]. However, Business Process Management also includes different directions of action in the goal-oriented control of the value chain of a company: quality, time, cost, and ultimately customer satisfaction [53].

Based on these definitional approaches, the activities of the BPM can be resumed in a life cycle [54]. Figure 1 links the phases of this life cycle to their corresponding outputs. Subject of this thesis is a process repository as an object and instrument of BPM. Therefore, this repository is also the recurring point of reference for the single activities in the BPM life cycle. The life cycle includes the following phases:

- **Process identification:** Based on the goal of the observation of reality, the relevant processes are identified and related to each other. Since usually more than one process is considered, so-called process maps or process architectures can be created.
- **Process discovery:** At this stage, the processes are modelled in detail in their actual state (as-is). Depending on the goal of the process documentation, different levels of details are useful. Due to the large number of processes, they are usually only manageable by means of a repository.
- **Process analysis:** The analysis of processes might reveal inaccuracies and possible approaches to improve the processes. These approaches should be documented.
- **Process redesign:** The inaccuracies and suggestions for improvement identified in the last phase are considered in this phase to redesign one or several processes (to-be processes). Usually, the changes result from a close interaction with the analysis phase. Therefore, it may be useful to summarize these phases or to achieve the desired improvements in the process over several iterations of analysis and redesign.
- **Process implementation:** In this phase, the to-be process is transferred into practice and the conceptual and modelled changes are implemented. The implementation requires organisational and technical adjustments.



- **Process monitoring and controlling:** In this phase, the success of the redesigns of the process is verified. This verification includes the definition of necessary measurement criteria and the supply of instruments. If the monitoring reveals new insights or deviations from the defined criteria, the process continues to be monitored or it will follow another iteration in the life cycle.

Given a large the amount of processes, it is possible and useful in all phases of the life cycle to manage the outputs of the phases in a repository. If BPM is understood as a life cycle, it becomes obvious that such repositories are already useful in early phases of BPM implementation.

## **2.2 Success factors und pitfalls of BPM**

BPM is used in a growing number of companies to achieve performance improvements, or even a further automation of processes. However, BPM or process-oriented organizations are not widely applied and the implementation projects are not always successfully finished. Therefore it is useful to consider the relevant success factors and pitfalls in more detail. A number of studies have considered the success factors associated with BPM initiatives (e.g. [55-59]). In the following, we discuss the success factors:

- **Strategic alignment**

A key success factor for the BPM implementation is the linkage between the BPM strategy with the business strategy [60]. The success of these initiatives is endangered as long as companies try to establish BPM activities independent of the strategic activities. The close linkage of a BPM initiative with the core processes implies a high degree of management attention [60]. Therefore, the management has to be committed to the BPM initiative [49].

- **Culture**

Culture consists of values, attitudes and behavior and influences the socio-economic structure "company" [61]. For the success of BPM initiatives, the corporate culture is of great importance. In particular, the key cultural conditions for successful BPM implementations are the willingness to change and an established change management. Further, the behavior of executives and their willingness to cooperate influence BPM initiatives [55]. Last, a good corporate culture also includes clear communication structures within the company and with its stakeholders.

- **Employees and their BPM qualification**

While the culture of a company influences the cooperation of employees, the BPM qualifications of an employee only affect this particular employee as an individual. His

attitude towards a BPM initiative determines the success. If employees are hesitant towards changes in general, they will also be critical towards BPM initiatives and therefore endanger the initiatives' success. Employees must have the necessary qualification, to transform the corporate reality into structured process models [62].

- Methodology

The employment of relevant methods is crucial for a successful BPM initiative. There are several methods leading to success, each method being suitable for a specific case or specific goals [55, 63]. Further, the capabilities, experiences and habits of the persons being active in the BPM initiative are important.

- Performance Measurement

Only what is measured is really relevant [64]. The establishment of a process-oriented measurements system may ensure the linkage of process orientation with business goals [57]. Therefore, concrete measures have to be defined for each business goal. The process steps and activities with the highest expected effects are being monitored, which might endanger the success of the BPM initiative [56].

- Information Technology

The role of IT for BPM was defined out relatively early [65], as IT plays a crucial role in the process implementation and automatisisation. Correspondingly, the stakeholder of BPM should have a very good understanding of the IT possibilities in order to model processes, reengineer and automate them [62].

In addition to the success factors, there are different pitfalls that have to be bypassed. In the following, we present pitfalls, which have already been discussed in literature (e.g. [59, 62, 66]).

- Lack of strategic linking:

Every success factor can also turn into a pitfall. Without the integration of BPM activities into the corporate strategy, the results of BPM do not match the (hidden) expected contribution, or consume resources for activities not compliant with the company's objectives [60]. If the crucial first step of the BPM life cycle turns into modelling a random selection of processes or even all of them, the project should be stopped.

- Lack of governance:

BPM governance is just as necessary as good corporate governance. Governance is another contribution to ensure the strategic linking; it enhances a clear communication and cooperation of all stakeholders of BPM [67].

- Lack of process owner:

Employees and in particular the managers must identify themselves with the BPM initiative at the process level. To this end, clearly identifiable process owners have to be determined, who accept this role and take over responsibility. The owner is not only responsible for the design and redesign but also for the execution of the process with its associated aspects such as process goals, planning, monitoring, the necessary resources etc.

- Lack of business need and lack of user buy-in:

If BPM initiatives start without the necessary strategic linking, then there is no business need for the initiative or single activities most of the time either. Also on the employee level, the lack of business need may lead to acceptance problems. Similarly, skill

shortages (BPM methods in general or the necessary skills for process modelling) negatively affect the employees' acceptance and therefore endanger the success of the BPM initiative.

The consideration of the presented BPM success factors and pitfalls can be beneficial for the stakeholders when planning and monitoring the progress of BPM implementations.

### **2.3 BPM in the public administration**

BPM is already established in the private sector. As with other approaches from General Business Administration, approaches from process orientation and process management can be transferred and applied to the public administration as well. However, the transfer of these approaches is associated with challenges. Further, it should be noted that there is little research about BPM in public administrations [4]. Based on [68], we describe below the special challenges of BPM in public administrations.

- Heterogeneity of the legal-political determined range of activities:

In contrast to most companies in the private sector, the spectrum of public tasks is heterogenous and differentiated by a corresponding number of core processes [12]. This heterogeneity hampers BPM initiatives.

- Legal requirements and conditions for the actions:

The administrative action is externally determined to a large extent, i.e. laws specify details and conditions and sometimes considerably restrict the scope of action of the public administration. Further, changing political conditions and preferences of the current regent coalitions at the federal level and state level result in amendments to existing laws and thus the (externally driven) need for process adaptations [4].

- Importance of information, knowledge and decision-making in the creation of administrative services:

The necessary information for the provision of services is distributed due to the hierarchical structure and the fragmentation of the administration of both institutions and across levels as well as within an organization. Similarly, decision-making processes are highly fragmented. Thus, they represent a particular challenge both as a subject and as a relevant element in a BPM initiative.

- Structure of the processes that are required to create the administrative services:

Processes are mostly less structured in public administrations than in the private sector. Therefore, despite the large number of institutions (> 11,000 administrative entities on the local level in Germany in 2013) with the same tasks, processes are not identical. These differences between the processes are due to unspecific legal regulations for those tasks. One example is the constitutionally defined self-government (cf. Article 28 of the German Basic Constitutional Law). The shared responsibility or “organized irresponsibility” (e.g. banners for the organization of local control, cf. [69]) interferes with the standardization of processes.

- Lack of management support due to strong segmentation of management:

Management responsibilities are distributed across many hierarchy levels. Therefore, it is difficult to equally involve all managers into BPM initiatives.

The presented challenges show the important differences between the private sector and the public sector. Hence, the success factors and pitfalls presented in chapter 2.2 cannot be easily transferred to the public administration, which requires further research. We are therefore investigating

- which functions a platform for process knowledge exchange in the public administration should have,



- which BPM implementation approaches from different countries in Europe can be generalized,
- what prevents individuals to share process knowledge, which fears exist and which strategies can be used to overcome them,
- which information are relevant for successful BPM and therefore for the administrative organization besides process models

In the following chapters of this thesis, the presented challenges are taken into account from different perspectives and we try to close the identified research gaps.



### 3. A process library for the German administration

#### 3.1 Introduction

After Business Process Management (BPM) is established as a management discipline in the private sector, it is also gaining importance for public administration. Cost pressures, the lack of resources, the demographic change and an increasing demand of customers for administrative services drive the efforts for modernization in public institutions.

BPM is therefore regarded as an effective tool to achieve the ambitious goals of modernization within public administration<sup>5</sup>. However, there are only few BPM initiatives in German public administrations<sup>6</sup>, the latter are still characterized by little exchange and lack of transparency. Although approximately 70% of the administrative services are based on federal laws, business processes are repeatedly documented in the various administrations and implemented differently<sup>7</sup>. To counteract this problem, the ‘*Nationale Prozessbibliothek*’ (NPL) was initiated. Its goal is to facilitate the exchange of business processes and expertise by means of a collaborative process platform. This platform enables members of the administration to acquire BPM knowledge, expertise, to share, exchange and reuse business processes.

Based on the theoretical framework of an open process library [70], we present challenges and requirements to implement such a process platform in the public administration as well as first usage experiences.

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<sup>5</sup> Cf. Government program of the federal government „Vernetzte und transparente Verwaltung“ p. 11 et sqq. With respect to the coalition agreement „Wachstum. Bildung. Zusammenhalt.“ from October 26, 2009 for the 17th. Legislature

<sup>6</sup> Process library of the federal state Schleswig-Holstein and the Free State of Saxony are only accessible for their respective federal state government; the KGSt process library is only accessible by their members, process house of BMI is only for internal departmental use

<sup>7</sup> The implementation of the EU Services Directive in the various federal states of Germany is a demonstrative example of such implementations: the underlying legal regulations (the Commercial Code) apply uniformly across federal states.

This chapter is structured as follows: Chapter 3.2 presents related work. Chapters 3.3 and 3.4 explain the specific problems in the administrative context and the design of the NPL. The survey results on the use of NPL and BPM in the administration are presented in Chapter 3.5. Different concepts for the transfer of the NPL into practice are discussed in Chapter 3.6. Chapter 3.7 gives an outlook on future research.

## **3.2 Related work**

The implementation of the NPL relates to the fields of knowledge management and BPM as a specialization of knowledge management in the context of e-government. The importance of knowledge management in the administration increases due to the aging of the administrative staff and the resulting structural shifts. By 2025, some German federal states are expected to loose 20% of their population<sup>8</sup>.

This loss will also reduce the number of employees in the administration. However, the workload will remain constant. Retired employees will most likely not completely pass on their expertise and knowledge to their successors.

Knowledge management is concerned with the preservation and structuring of knowledge in an organization. Alavi and Leidner [71] identify three main general applications of knowledge management: (1) the creation and sharing of best practices, (2) the development of common directories and (3) the creation of knowledge networks. Only at a later stage of the research project NPL, the focus will switch to category (3), because first of all the willingness to share knowledge has to be developed.

The underdeveloped willingness to share knowledge is inconsistent with the acceptance of reference processes or best practices made available top-down. A requirement for the building of knowledge networks is also the possibility to connect different decentralized knowledge management systems to a centralized system across organizational boundaries

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<sup>8</sup> BBSR-Population forecast 2005-2025

for a specific purpose [23, 71]. Traditionally, knowledge is defined by the concept of knowledge hierarchy as an interpreted structured information [72].

This structure is found again in business processes and their metadata, which present public administration services in a structured form. [3, 73, 74] analyse the topic of business process and knowledge management in the public administration from different angles. Becker et al. [3] characterize business processes and business process components as structurally similar and reusable despite the high number of different services. For them, the most important inhibitors to an efficient realization of BPM in the public administration are the redundant efforts in BPM and an intra-organizational and inter-organizational knowledge deficits because of poor exchange and lack of networking. Based on these findings, they encourage the collaborative creation of a process database that enables the sharing and reuse of process knowledge and process models. [75] present a platform for reference models exclusively for municipal administrations [76].

[73] present both the challenges and the potentials of the BPM in the administration. Various BPM concepts focusing on e-government are subject to the following case studies. Menne-Haritz in [73] emphasizes the advantage of electronic cooperative communication, especially the preservation of knowledge, the easy adaptability and also the easiness to adapt to the work rhythm of each employee. Falck in [73] describes the initiation of a virtual community on BPM in the Berlin administration. According to her, the largest obstacles when developing BPM in the administration are a lack of knowledge off the staff about their administrative processes and the weakly pronounced culture of information dissemination. The sharing of information only occurs for one's own advantage [73].

In contrast, [77] highlights the positive impact of collaborative work, in this case the effect of recommendations of other users about the quality of knowledge concerning process models and process modeling. According Zboralski [78] and the theory about strong and weak ties between users in communities of practice (CoP), requests for information of users connected with weak ties result in better answers. Transferring this results to relationships across different levels, different administrations and the mostly weak ties

between users of the NPL, these are favorable conditions for the introduction of an online collaboration and process platform.

Kusterer [79] investigated measures of quality assurance in knowledge management by means of different case studies. He analyzes quality assurance in knowledge management based on five dimensions: important (important knowledge), right (validation of new knowledge), relevant (application of existing knowledge), inaccurate (verification and update existing knowledge) and unimportant (disposal of irrelevant knowledge). Based on this framework, he concludes that wiki-based knowledge management systems will achieve a satisfying quality of the knowledge base if many users contribute to this base and therefore also correct false content. He also considers necessary the nomination of a knowledge manager, e.g. a moderator, in order to maintain a knowledge base. The task of a knowledge manager consists of encouraging employees to contribute valuable input or missing content. [70, 80, 81] describe the requirements for a process database as well as the function and architecture of a platform. Those requirements also have to be met when implementing the NPL. Areas of research in the field of BPM for public administration, which should be further explored, are shown by [4].

### **3.3 Specific challenges in the context of public administration**

The research project NPL is embedded in the field of public administration. This field is characterized by a variety of specificities. Those specificities serve both a strategic differentiation and are substantial reasons for the not yet successful implementation of process management approaches. The currently available repositories are based on commercial and costly products<sup>9</sup> or aim exclusively at administrations<sup>10</sup>. The approaches

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<sup>9</sup> Examples: Picture Improvement Network: paid membership in the community, which includes the usage of tools and value-added services; ARIS community: the membership is free of charge, but may require the usage of commercial software

<sup>10</sup> Process House of the Federal Ministry of the Interior (Bundesinnenministeriums)

that have been initiated by various levels of administrations are isolated applications that rely neither on an exchange nor on transparency.

The acquisition of a process-modeling tool is often the first step of an administration towards BPM. An analysis or the definition of goals of the process orientation or optimization is often not realized. The tool is often equalized with the methodology. The missing methodology often either leads to approaches that only follow a technical or a functional modeling and there is no linkage between both approaches.

Another issue is the narrow focus on the own administration when analyzing processes. Even in the public administration, processes pass organizational borders. According to [11], there are large development potentials hidden in the transparency of the process chains for administration and the economy<sup>11</sup>. A concatenation of processes across levels, however, has not yet taken place. Yet, this concatenation is a prerequisite for inter-organizational exchange and cooperation, e.g. in order to implement effectively shared service centers.

Contrarily to the private sector, the public administration is strongly influenced by political and organizational power structures, which is also reflected by the skepticism against the publication of internal and external administrative processes.

However, the growing movement Open Data recognizes the potential of transparent and open data [82]. Further, the majority of the employees in the administrations are not familiar with the possibilities of the use of Web2.0 technologies [13]. Another challenge is the age and the associated lack of IT affinity of the employees of the administrations. The age structure represents a special challenge when introducing and activating an online collaboration knowledge platform.

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<sup>11</sup> Federal Ministry of the Interior: Konzept - Handlungsfeld Prozessketten im Programm E-Government 2.0; [http://www.verwaltung-innovativ.de/nm\\_684238/SharedDocs/Publikationen/DE/prozessketten\\_im\\_programm\\_e\\_government\\_2\\_0.html](http://www.verwaltung-innovativ.de/nm_684238/SharedDocs/Publikationen/DE/prozessketten_im_programm_e_government_2_0.html) last access at 15.04.2013

### **3.4 NPL architecture**

The goal of the three-year research project NPL (the first part of this project ends in May 2013) is to construct a process platform, which meets the BPM problems in the administration, in particular to reduce redundant efforts and to improve the collaboration of institutions and across levels. The aim of the NPL is to document administrative processes across all levels of the German administration for the first time in history. In addition to the process platform, a collaborate knowledge management platform about BPM is build.

The inter-organizational exchanges and cooperation should be further extended, e.g. in the form of shared service facilities. In contrast to currently available repositories, the NPL follows an open approach. Employees of all German administrations can upload process models and knowledge in all available notations and tools. Especially novices in BPM can obtain information and contact experts. The persons responsible in the administrations for process management will be enabled to quickly get in contact with other persons responsible and to build up a network. Collaboration and the opening of administrations across organizational borders will be achieved by means of a cascaded release model.

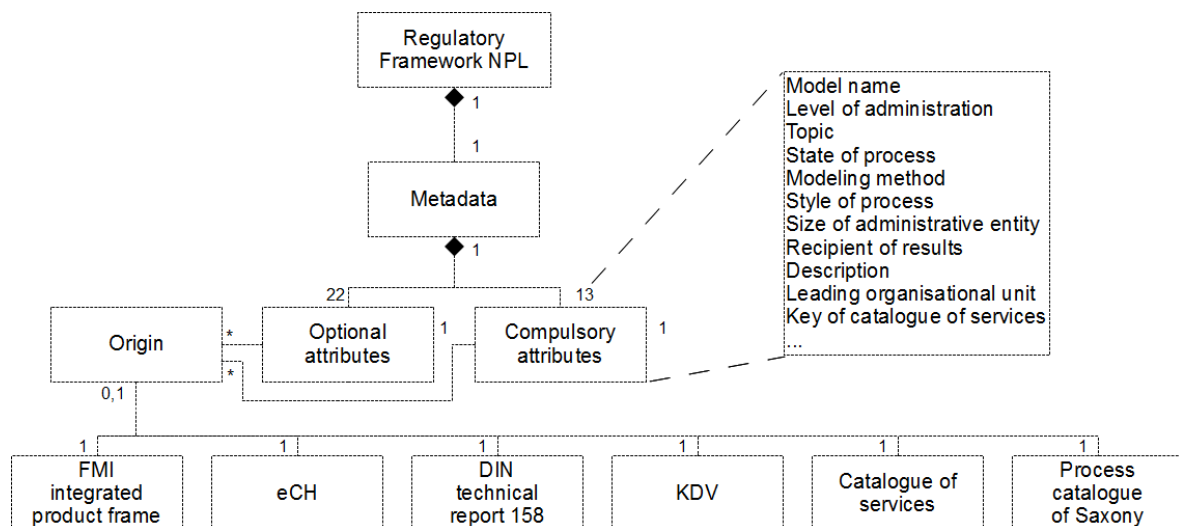
The activation of the community is a crucial success factor for the platform. Existing barriers will be eliminated by creating the following framework conditions: The use of the NPL is free of charge for administrations, a closed user group without access for third parties, collaboration functionality and the integration of different tools and existing process repositories to the NPL. However, the challenge remains to attract users with interesting content. Tutorials, a glossary, a wiki and processes from selected flagship projects will be included to increase the functional and substantive benefits and the reuse of information when going live with the project.

#### **3.4.1 Origin and structure of the NPL framework**

In order to gain acceptance at all levels, the governance structures for the categorization of administrative processes of different BPM initiatives were investigated and evaluated in a national and international context. A NPL framework has been designed in workshops in



several iterations with representatives from municipal, federal state and federal level. This framework describes the mandatory and optional metadata for a process model. It takes into account the attributes of the product catalogue of the KGSt<sup>12</sup>, the Integrated Product framework of the Federal Ministry of the Interior (BMI), attributes of the process descriptions of Saxony, the DIN Technical Report 158<sup>13</sup> (created by a specialized group of management and economy), attributes of the service catalog (LeiKa)<sup>14</sup> and the Swiss e-government initiative for e-government standards (eCH)<sup>15</sup>. The LeiKa is created by an expert group of representatives from the state, the federal state and municipalities and form a list of all administrative services.



**Figure 2:** NPL framework

<sup>12</sup> Municipal Association for Public Management, in German = Kommunale Gemeinschaftsstelle für Verwaltungsmanagement; <http://www.kgst.de>

<sup>13</sup> <http://www.nia.din.de>

<sup>14</sup> <http://www.gk-leika.de/Startseite/leika/online-leika/>

<sup>15</sup> <http://www.ech.ch/vechweb/page>

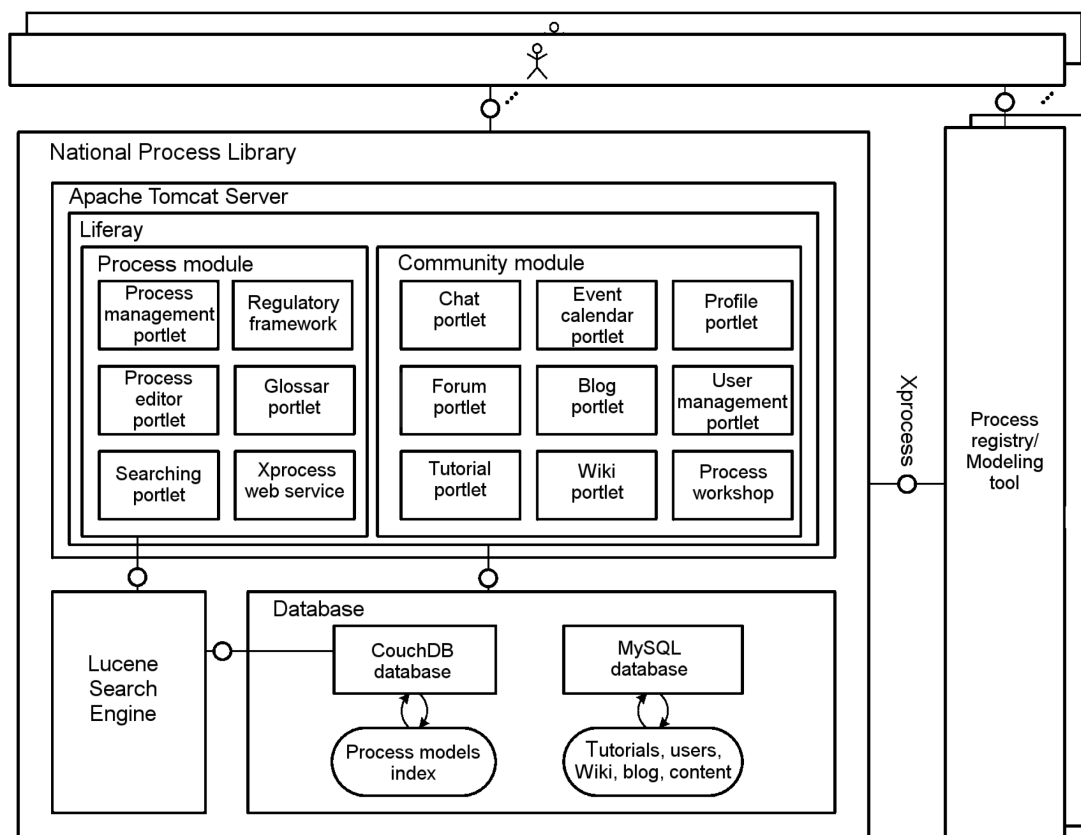
Figure 2 shows the composition of the NPL framework and provenance of the metadata as well as a summary of mandatory attributes of the regulatory framework (see Appendix, chapter 8.1.1). A central component of the framework is the LeiKa that represents a collection of all administrative services and their descriptions, which are addressed to external customers. LeiKa provides the user-specified metadata and a consistent description of an administrative service and the underlying legal regulations. The LeiKa was extended by descriptions to also include support processes.

### **3.4.2 System architectures and components**

[70] introduces the conceptual requirements for an open process library and its implementation in practice: Figure 3 shows the system and its components as well as the users who interact with the NPL. The NPL consists of a process module and a community module, which is presented in section 3.4.3 and section 3.4.4. As part of the efforts of the administrations to increasingly use open source products [83] and the desire to develop a provider independent and open process library, free access open source products have been evaluated and used for the implementation of the NPL. It is mainly based on the Java-based Open Source Community Framework Liferay<sup>16</sup>. The process module required a complete redesign, whereas the portlets of the community components only needed to be adapted.

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<sup>16</sup> <http://www.liferay.com/>



**Figure 3:** System architecture of the NPL

To ensure a simple full-text search for the content of the NPL and the corresponding metadata, the Open Source search engine Apache Lucene<sup>17</sup> is used. The database for the process module is a document-based Apache CouchDB<sup>18</sup>. Liferay platform uses a MySQL Database<sup>19</sup> and runs on an Apache Tomcat Server<sup>20</sup>.

<sup>17</sup> <http://www.lucene.apache.org/core/index.html>

<sup>18</sup> <http://couchdb.apache.org/index.html>

<sup>19</sup> <http://mysql.com/>

<sup>20</sup> <http://tomcat.apache.org>

### **3.4.3 Process module**

The process module consists of the following components: process management, process editors, regulatory framework, glossary, search and Xprocess web service. The main components of the process module are process management, the regulatory framework, Xprocess and search.

The process management component provides amongst others the functions upload, download, editing of process models, bookmarks, copying and sharing. [70] has highlighted the requirement to handle different process modeling notations and file formats.

To ensure tolerance and not to exclude any process project, the process management component allows uploading process models in any form. Several source data files can be attached to the process model. The source data files can be described in the metadata of the process model and can be represented by means of a visual representation in the system. The download function provides several ways of download. A process model can be downloaded along with its metadata as Xprocess, XML file, as a PDF, without metadata, as the source file or image file. The Xprocess file exports all attachments such as the source file and the image file. In order to find a specific process among the large number of processes, the user can use the full-text search. Further, the user can navigate through the collection of processes based on the regulatory framework. A keyword filter allows filtering according to user-specific tags.

The regulatory framework (see 3.4.1) plays a central role in the NPL. It is not only used for finding process models, but also sets the mandatory attributes of metadata during upload of a process model. Unlike normal repositories, a description of the underlying process model has to be documented in the metadata. The optional and flexible user-specific metadata can complement the process description.

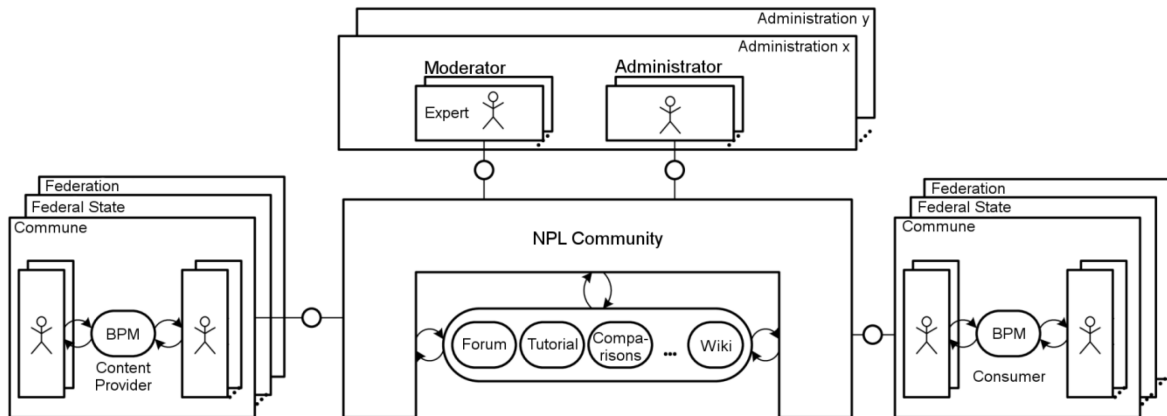
For the first time, the development of xov standards<sup>21</sup> Xprocess allows the exchange process models between different organizations independent of a particular software provider (see Appendix, chapter 8.1.2). This is a first step for the reuse of process models. Xprocess is both a technical and a professional standard. Functionally, the mandatory attributes for process models are essential in the NPL. Technically, the metadata, the source files and the image file are provided via an XML file. Organizationally, the provider of the corresponding modeling tools have been involved early on, in order to ensure that the import and export of process models in the NPL can be executed with little effort. First prototypical implementations already exist on the provider side.

#### **3.4.4 Community module**

The community module enables the exchange about BPM topics, challenges, activities and projects. The user can use the wiki, forum, tutorial, the workshop or the blog. Direct communication between users and groups of users is facilitated by the chat function and the personal profile of a user with an inbox. Therefore, users can chat with each other or send e-mails. Users of the NPL can take different roles: consumer, content provider, moderator or administrator. The consumer can read content in the NPL, can comment on wiki entries, read and write in forums and use the tutorials. Content provider can write wiki entries, create tutorials and further content (Manuals, Success-Stories, etc). A moderation realized by an expert is necessary as many users are expected to use the NPL [79]. The role of the moderator is to administer the content. Experts are named by users of the NPL and are introduced by the administrators. Experts moderate one field of topics. They answer user questions and create wiki entries. Moderators ensure that users are compliant with the forum rules and can control the discussion. They are allowed to structure content, to move it to the adequate field of topic or initiate the deletion of an entry, which will be executed by the administrator. Therefore, moderators ensure the quality management. An administrator is in charge of the user management and edits the content when asked by a moderator.

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<sup>21</sup> <http://www.xoev.de>



**Figure 4:** NPL community module

Figure 4 depicts the community module with its different user roles. Employees of different administration will provide the content for the NPL. The figure shows that content and results uploaded in the NPL have usually undergone a quality assurance, e.g. modeling guidelines for a process-modeling workshop.

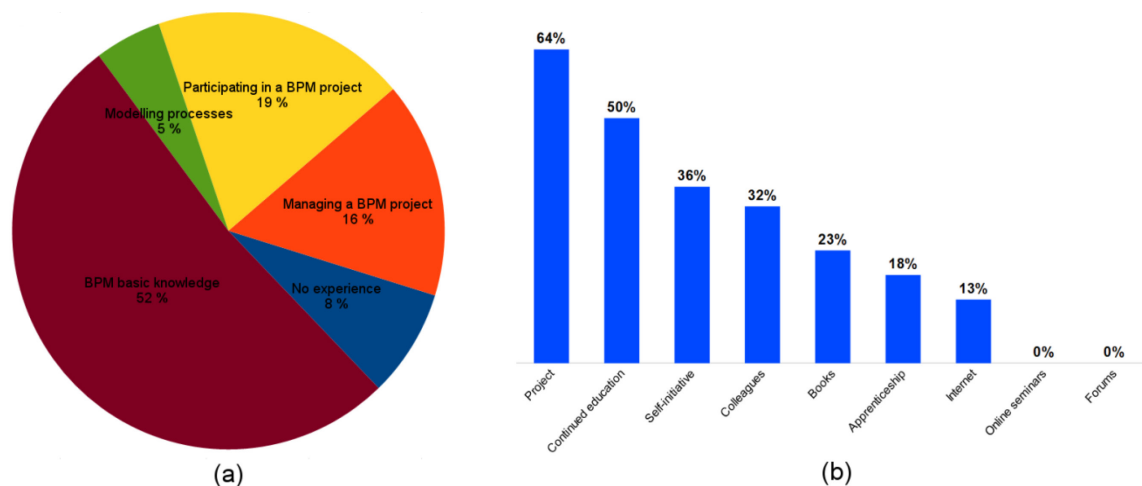
The quality assurance is realized online as well as offline. [78, 79] recommend verifying the quality of the content created by collective intelligence by the moderator. Every user can communicate false entries to the moderator. The moderator verifies the entry and if necessary asks the administrator to correct or to delete the entry. This mechanism allows every user to increase the quality of the content by directly commenting on a specific entry or improving it, or by communicating the entry to the moderator.

The workshop offers its users the possibility to compare their process models, metadata as well as other key performance indicators.

Further, the workshop offers the possibility to name reference processes or optimized to-be processes. The focus is on the comparison of processes or parts of processes. The quality assurance and the improvement of one's own processes are encouraged by the exchange and the discussion with other employees.

### 3.5 Evaluation of the NPL

After the three-week user tests, we conducted a quantitative survey among the users with the goal to evaluate the usability, the relevance of the single functions, the content of the NPL and the status quo concerning BPM in the administration. We invited 70 employees of different administrations on the federal level, on the federal state level and on the municipal level. Twenty-six employees replied (response quote of 37 %). The survey consisted of 49 questions concerning the knowledge about BPM, the familiarity with modeling notations and modeling tools, business process modeling in public administrations, online communities and social networks, relevance and usability, and the further development of the NPL.



**Figure 5:** Survey results concerning BPM knowledge (a) and Acquisition of BPM knowledge (b)

Figure 5(a) shows the results of the survey concerning the BPM knowledge of the participants. Out of 26 participants, 52 % have a basic knowledge, sometimes even experience in modeling. Only 8 % did not have any BPM knowledge. Sixteen percent already managed BPM projects and 19 % already participated in those kinds of projects.

Figure 5(b) shows how the participants acquired their BPM knowledge. Most participants acquired their knowledge through learning by doing in process projects or through trainings.

Surprisingly, none of the participants stated to have participated in online seminars or forums. This result could indicate a lack of offers for BPM online seminars for the public administration, which will be provided by the NPL. Most participants (64 %) claimed to have modeled between 1-10 % of their business processes. Fifteen percent claimed to have modeled between 11-25 % of their processes, 5 % stated to have modeled between 26-50 %. Only 16 % have modeled more than 51 % of their business processes. None of the participants has modeled business processes. The information about the number of existing business processes in the respective organization varies between 1 and 10.000. However, most of the participants (60 %) stated that only 1-100 business processes existed in their administration. The large spread in the data can be explained by the different individual perceptions, the size of the different administrations and the position of the participant within the administration.

The implemented functions described in sections 3.4.3 and 3.4.4 were consistently rated as relevant and user-friendly. Functions were evaluated on a five-step Lickert scale. In particular, the "Copying a Process" was rated as highly relevant: 86 % rated this as a relevant or very relevant and 14 % were neutral to the function. The BPM knowledge and experience does not affect the relevance of this function. Novices particularly appreciated the functions "Send as email process" and "contact the process responsible parties". Particularly important is the direct image of the process models (95 %) and their metadata (70 %) was evaluated. Of the functions for finding the search processes (95 %) and various filtering mechanisms (86 %) were considered to be very relevant as expected. Similarly, the respondents rated the download of metadata with process image in PDF and to download the source file to be very relevant. Less relevant to the functions were "process to download an image file" or "General Download". Especially the novices appreciated the functions "send process via e-mail" and "get in contact with the process responsible".

Most participants rated the possibility to directly view the process model (95 %) and their metadata (70 %) as very important. Further, the search to find processes (95 %) and the different filter mechanisms (86 %) were evaluated as very important. Last, the participants evaluated as very relevant the download of the metadata with an image of the process as



PDF and the download of the source file. The participants evaluated as being less relevant the function “download process with image” or “download all”.

Surprisingly, the function to define a process model as “private” was rated as irrelevant. On the one hand, the NPL is a platform for exchange. On the other hand, there are privacy concerns, which were stated by the participants when being asked about the usage of the social community platform.

Concerning the usage of Web 2.0, social networks and collaboration tools, more than half of the participants (65 %) stated not to be a member of any online community. The remaining 35 % stated to be a member of at least one online community, but to use them mainly for private purposes. Only 43 % stated to also use online communities for professional purposes. The largest obstacle for the usage of social networks and online collaboration platforms are privacy concerns. The participants stated to feel insecure about the further usage of their personal data and entries. This shows the missing guidelines for the usage of social networks and online collaboration platforms in the office. Therefore, we recommend administrations to provide guidelines to their employees, which allow them to use social media for professional purposes compliant with legal requirements.

The usage of NPL in a specific administration can be measured by means of the number of employees who are in charge of BPM. Five percent of the participants do not have any persons responsible for processes, 59 % only one to five persons in charge, and 36 % stated to have more than six persons responsible for BPM.

Forty-two percent of the participants stated not to have any exchange concerning BPM with employees of other administrations. Only 12 % communicate one a month or weekly. Sixty percent of the participants were able to solve their questions after an exchange. The remaining 40 % were not able to solve their problem after the exchange. These results clearly indicate the great value of the NPL for the administration. It offers new possibility for exchange, to communicate with experts about methods and content.

Concerning the desired content, participants evaluated the following topics as being very important: Best practices, standardization and reuse of business processes, reference processes, information and guidelines to manage process modeling projects, contact information from experts, and the exchange concerning BPM. For the NPL, we will develop the content accordingly.

The results of this survey can be seen as representative for BPM interested employees of administrations on different hierarchy levels and the expected users of the NPL. However, they are not representative for all employees of German administrations.

### **3.6 Operating the NPL sustainably**

The NPL will be available to all employees of German administration by the end of the project in May 2013. Therefore, a business model is necessary to ensure the economic sustainability. Based on the considerations of [84], we will consider the following elements for a business model. First, it is necessary to analyze the target customers or groups, the channels of distribution, a management concept and an analysis of the products offered to the customers. Further, a sustainable business model includes one-time services as well as continuing services. The elements for the operation of these services<sup>22</sup> should be described in the business model. One part of the business model is the revenue model, which describes the services, which have to be paid for.

Out of all elements from a business model, we will only consider the customer model and the revenue model. The customer model differentiates between the main target groups administrations, companies and citizens (cf. figure 6). They can be distinguished according to their service demand to the NPL and the combination of services with third party data and services. The number of users of the platform will primarily be composed of German administrations and their employees. There are 30,000 administrative entities in Germany

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<sup>22</sup> Based on the considerations above, annual operational costs are estimated to 500.000 €

and we expect 1-2 users per entity, which makes a total of 40,000 users in the administrations. If the community module can be successfully established as a medium for knowledge sharing, we expect up to 1.5 million employees of administrations as NPL users.

Companies as customers are especially important for the inter-organizational processes and process chains. According to [10], companies can further optimize processes in collaboration with the administrations. Citizens are directly as well as indirectly addressed by the services of the NPL. They can contribute to the current discussion about Open Government Data or Linked Open Government Data and influence in general the administration and politics.

		Internal			External		
		Transpa- rency	Partici- pation	Collabo- ration	Transpa- rency	Partici- pation	Collabo- ration
Administration	within an organisation	x	x	x	x	-	-
	within a level	x	x	x	x	x	x
	across levels	x	-	x	x	x	x
Economics	directly affected	-	-	-	x	x	x
	indirectly affected	-	-	-	x	x	-
Citizen	directly affected	-	-	-	x	x	x
	indirectly affected	-	-	-	x	x	-

**Figure 6:** target group specific benefits of the NPL

Until now, a key assumption for the development of NPL so far is that it is exclusively aimed at employees of public administrations. However, with development of the revenue model, a paradigm shift has been initiated. This shift leads to the extension of the target groups. Thus, in addition to the administration, companies and citizens are target groups. However, they have to comply with strict confidentiality rules and the application of a consequent staging model in order to use the NPL. All process models in the NPL are attributed one of the following statuses: “private”, “public”, or “OGD” (Open Government Data).

Based on these considerations, different revenue models are possible (cf. to [85] and [86]). The basic paradigm of the NPL foresees a complete funding from the budget of the involved federal states and of the state according to the '*Königsteiner Schlüssel*'. In addition to these contributions, other revenue models are conceivable: The advertising model allows commercial BPM software providers to advertize on the NPL via Xprocess. The subscription model is based on fees for the usage of NPL. However, this model is only suitable for special value-added services such as the supply of the top ten processes of the month to the subscribers or the participation in special topic workshops a certain number of times per year. The commission-based model allows assigning the respective authorship of an involved consulting company to single processes. Fees are charged when qualified third party users access the process models. A similar model is the referral-based model, in which transferring information or customers generate revenues. One possible solution is to transfer users to commercial software provides, which offer suitable solutions to single processes. Several value-added services can be offered in the fee-for-service model. Examples for these services are moderated offline meetings of sub-communities or the organization of open innovation processes. The fee-for-service model also allows the enrichment or linkage of the information in the NPL with open data (required status: "OGD") to provide maximum benefits. Public contests (so-called open innovation process) are best suited for the effective use of open data and information. In order to use such approaches it is necessary to develop an independent process model. Further, it may be beneficial to realize these process models by means of an PPP. In addition to traditional, budget-funded approaches, the listed models can be refined and put together to an overall model in future work.

### **3.7 Conclusion**

After the introduction to the administrative context and the associated challenges, we presented in this chapter at hand an unprecedented project in the administration, the "*Nationale Prozessbibliothek*", a process platform for the German administration. In particular, we shed light on the architecture and concrete implementation of the NPL. We

received exclusively positive feedback on the use of NPL by means of a survey. The survey showed that the NPL closes the gap between knowledge management and process management because it responds to the requirements and needs of the domain. There will be a long-term study about the success of the NPL, in particular about its impact on the quality of process models, the BPM knowledge of employees in the administrations and the effect of the NPL on the networking between the employees. However, this could not be carried out due to the early stage of the project. However, this could not be carried out due to the early stage of the project. To sustainably continue to operate this project after the funding ended, we presented various revenue models, which take into account the limited budget and are supposed to minimize the financial burden.

Future work will include the examination of the heterogeneity of service processes, the relationship between them, process chains across different administration levels, the revenue model and the activation of the community. The results at hand from the preliminary survey will be supplemented by a comprehensive analysis of the benefits of the NPL.



## **4. BPM in Public Administration in Germany, Switzerland and Austria - Case Study**

### **4.1 Introduction**

Nowadays business process management (BPM) and business process modeling are well-established practices in the private sector. However, considering the public authorities in Europe, it turns out that the process orientation in the public administration is still in its early stages. Nevertheless, due to new demands and budget cuts at the same time, business process management is also gaining more and more importance in public authorities [9].

While some insights about the successful implementation of process management might be directly transferred to public authorities, there are also some important differences, which need to be taken into consideration. First, the legal and political conditions in public authorities often prohibit the application of traditional process reengineering approaches as for instance proposed by Hammer and Champy [49]. Second, the specific challenges in public authorities partially significantly vary from those in industrial practice [1, 87]. Taking for instance a look at the service portfolio of municipalities, there are more than 1000 interconnected and interdependent service processes [9]. Hence, the overall question is how BPM can be successfully implemented in the context of public administration.

Accordingly, the goal of this chapter is to shed some light on the question how BPM can be successfully taken to public authorities. Building on prior work [88], our contribution is a list of success factors resulting from the comparative analysis of three case studies from Germany, Switzerland and Austria. As there are, to our knowledge, almost no insights on the successful implementation of BPM in public administration, we consider our findings to be an important first step towards a solid understanding of implementing BPM in the public authorities.

The rest of the chapter is structured as follows. Chapter 4.2 gives an overview of our research methodology and explains the data collection procedure. Chapter 4.3 presents the actual comparative analysis of the three case studies. Chapter 4.4 discusses the implications of our work before Chapter 4.5 concludes the chapter 4.

## **4.2 Methodology**

This section introduces the methodology of our research. In Section 4.2.1 we explain the general design and data collection. In Section 4.2.2 we systematically derive the criteria for the comparative analysis.

### **4.2.1 General design and data collection**

The research method of our work is a comparative analysis based on a multiple case study design. In general, case studies allow the researcher to investigate a phenomenon within its real-life context [34]. The advantage of multiple case studies is possibility to additionally gain insights from the comparative analysis of the cases.

For the data collection we conducted interviews with different employees of public authorities in the respective countries. In total we conducted 13 interviews: six in Germany, five in Switzerland and two in Austria. In each country we included employees from different positions to avoid biases resulting from a particular viewpoint. In the six interviews from Germany, we interviewed three clerks from municipalities and federal authorities, two lower authority managers, and one top manager. In Switzerland we interviewed two clerks from municipalities and federal authorities, two lower authority managers, and one top manager. In Austria we interviewed two top managers.



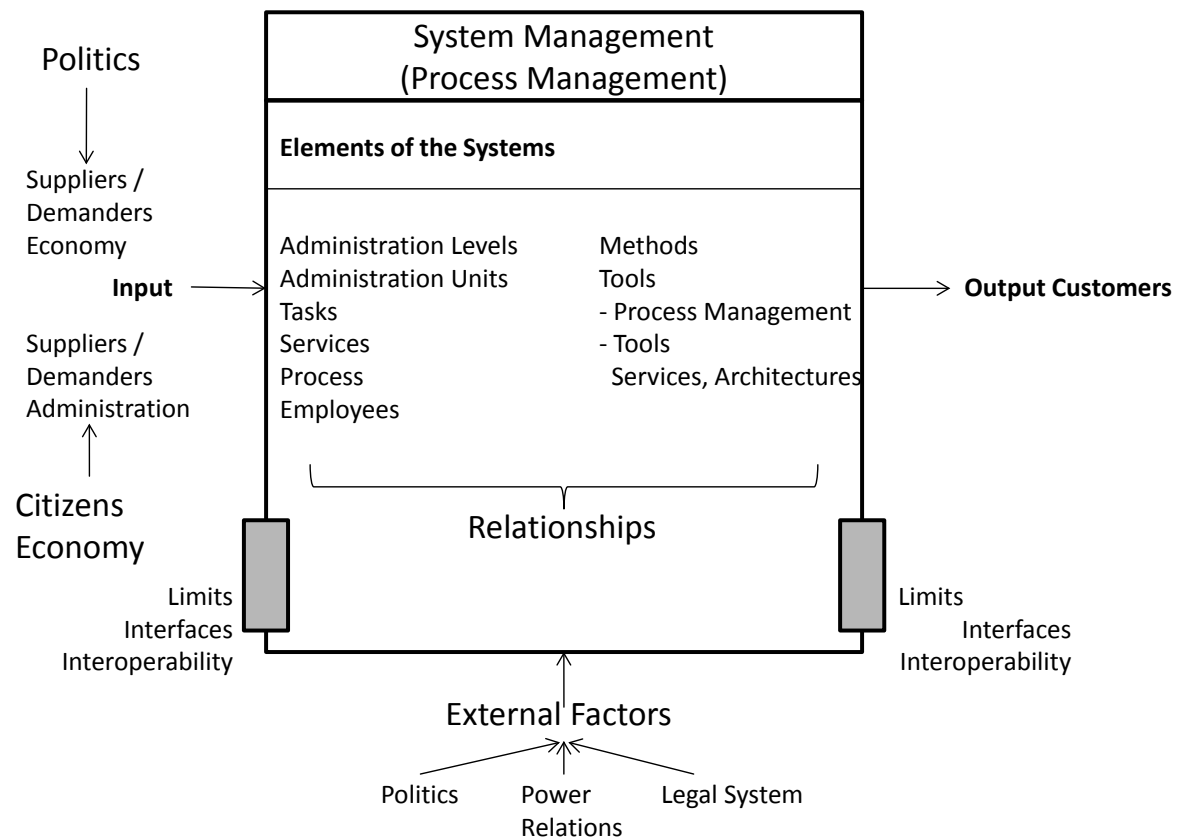
**Tab. 2:** Overview of conducted interviews

	<b>Germany</b>	<b>Switzer- land</b>	<b>Austria</b>
<b>No. of interviews with clerks</b>	3	2	-
<b>No. of interviews with lower managers</b>	2	2	-
<b>No. of interviews with top managers</b>	1	1	2
<b>Total No. of interviews</b>	6	5	2

For the analysis of the interviews we used the qualitative content analysis as described by Mayring [35].

#### **4.2.2 Derivation of Comparison Criteria**

For the derivation of suitable comparison criteria, we investigated literature on BPM in public administration. In this context the so-called system models are of particular interest as they deal with the question how BPM can be positioned in public administration [4].



**Figure 7:** System Model

Building on the insights from Traunmüller, Wimmer [8] and Schaffroth [89] the administration (process management) can be represented as a system - with input and output (see Figure 7). The input usually comes from the suppliers (private sector or other administrations) or customer requests by means of forms. The output typically takes the form of bilateral service exchanges between the customer and administration. The elements of the BPM system, which is determined by the input and output as well as by the system limits, respectively exist on each organizational level of the administration, such as German Federal Government/federal states/local authorities. The division of tasks between these elements and the relationships are clearly defined in accordance with the constitution, legislation, and directives (subsidiarity). These determine the tasks of the administration, which can in turn be accessed through services. From a technological point of view, this system includes methods, tools (for the BPM as well as for the technical implementation of

business processes) that are in turn used by the administrative units. The system of process management in turn is determined by means of external factors: Politics, market, justice system.

From the presented system we can derive certain comparison criteria for the case studies at hand. Adding a consideration of the remaining challenges, we will focus on the following five criteria:

- Framework conditions (politics, justice system, culture and market)
- Input variables
- Methods and standards
- Tools (modeling, application and implementation tools for process management)
- Challenges

In the following, we will use these criteria for analyzing and comparing the three case studies from Germany, Switzerland and Austria.

### **4.3 Comparative analysis of case studies**

In this section we present the results from the comparative analysis of the three case studies. Tab. 3 provides a first overview of the cases based on the comparison criteria we derived in Section 4.2.2. In the remainder of this section we will elaborate the details of the comparison. Therefore, we will discuss each comparison criterion in detail.

**Tab. 3:** Overview of the investigated cases

Criteria	Germany	Switzerland	Austria
<b>Framework Conditions</b>	<ul style="list-style-type: none"> <li>• Federal decision making</li> <li>• Strict separation of economy and administration / only beginning partnerships</li> </ul>	<ul style="list-style-type: none"> <li>• Federal decision making/ direct democratic</li> <li>• Partnership between economy and administration</li> <li>• Consensus-oriented culture</li> </ul>	<ul style="list-style-type: none"> <li>• Federal decision making</li> <li>• Strict separation of economy and administration / only beginning partnerships</li> </ul>
<b>Input Variables</b>	<ul style="list-style-type: none"> <li>• Predominantly paper-based</li> </ul>	<ul style="list-style-type: none"> <li>• Predominantly paper-based</li> </ul>	<ul style="list-style-type: none"> <li>• Comprehensive electronic inputs via <i>ELAK system</i> (Elektronischer Akt)</li> </ul>
<b>Methods &amp; Standards</b>	<ul style="list-style-type: none"> <li>• No BPM guidelines BPM</li> </ul>	<ul style="list-style-type: none"> <li>• eCH standards</li> </ul>	<ul style="list-style-type: none"> <li>• No BPM guidelines / orientation towards technical implementation</li> </ul>
<b>Tools</b>	<ul style="list-style-type: none"> <li>• Adequate tool support for current maturity level</li> <li>• Interorganizational exchange platform available</li> <li>• Tool is deployed (yet no or minor standardization)</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate tool support for current maturity level</li> <li>• Broad acceptance of standards</li> <li>• Interorganizational platform is prepared</li> </ul>	<ul style="list-style-type: none"> <li>• High level of integration with respect to technical infrastructure</li> </ul>
<b>Challenges</b>	<ul style="list-style-type: none"> <li>• BPM initiative is either driven by business or IT / but no sufficient interlocking of business and IT</li> <li>• Externalization of process knowledge</li> </ul>	<ul style="list-style-type: none"> <li>• BPM initiative is either driven by business or IT / but no sufficient interlocking of business and IT</li> <li>• Externalization of process knowledge</li> </ul>	<ul style="list-style-type: none"> <li>• BPM initiative is strongly driven by technology / no sufficient interlocking of business and IT</li> <li>• Externalization of process knowledge</li> </ul>

#### **4.3.1 Framework conditions**

In general, it can be stated that BPM has reached the practice in public administration. The diffusion is not very high yet, but various initiatives are in progress on all federal levels in all of these countries.

Overall, the framework conditions in the investigated countries can be considered to be rather similar. In all three countries we observe a federal structure of the administration. Although Switzerland is based on consensus-oriented democracy, the structure of the public administration is similar to Germany and Austria. However, the size of the overall population in Switzerland cannot be denied as an influencing factor. In Further, in Austria the federalism is less strict since the autonomy of the federal levels is a bit smaller than in Germany or Switzerland.

Nevertheless, all in all, we did not observe a significant impact of the framework conditions. Although the framework conditions are similar, the current implementation of BPM is rather different. Consequently, we may conclude that the opportunities resulting from the local conditions are realized to a different extent. For instance, in Germany the federal structure of the public administration is frequently used as justification for the current state of affairs and thus is one of the most significant de facto obstacles for a faster implementation of the BPM approach. Although Austria and Switzerland have similar conditions, we did not encounter such problems in these countries.

Nevertheless external factors act on the system and can cause an acceleration of the implementation of the BPM approach. The German Federal Government and the federal states have set themselves significant consolidation targets by means of the *Schuldenbremse* (debt brake); this means the administrations have to slim down considerably. This can only be achieved by means of automation of the business processes (among other measures). The European financial and debt crisis is likely to accelerate this process even further. Simultaneously, the demographic developments in Germany are creating an enormous pressure to preserve the expertise of employees who leave the organization. This expertise can be preserved in process modules, with the additional

benefit that this creates a basis for redesigning the processes, if this should become necessary. Comparable measures for reducing the reducing the overall administration costs are also taken in Austria and Switzerland.

In all of these three countries, the approaches in part also have political backing. This has to be strengthened in future, as the political support and the support of the management of the administrative units are central success factors for the introduction of BPM. Since the introduction of BPM is always accompanied by significant changes in culture and operational procedures, the implementation of BPM should be understood as part of a huge change process. As frequently reported in literature on change management (e.g. Hiatt and Creasey, 2003 [90]), this again emphasizes the importance of a strong management support.

#### **4.3.2 Input variables**

Input variables are an integral and important factor in the BPM system model as they represent the starting point of every process. Moreover, they may have significant implications for the execution of the process. The processes in the administrations of *Germany* and *Switzerland* are predominantly initiated by paper-based input variables (which are also referred to as *process data*). Hence, the data must be digitalized for further processing, which entail tremendous efforts. In any case, the data is often transformed in for a specific process, which inhibits the interoperability of the input variables.

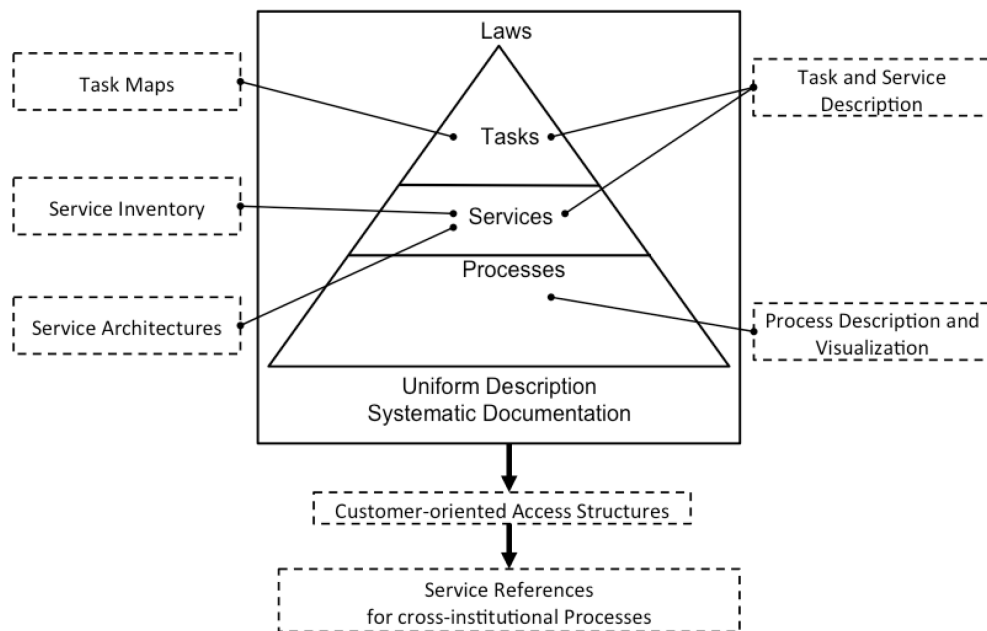
By contrast, *Austria* uses the *ELAK* system for electronically initiating and executing their processes. As a result of the central storage of input variables, interorganizational processes can be efficiently designed and executed.

#### **4.3.3 Methods and standards**

The most significant differences can be found in the form and procedures of the standardization. *Germany* is pursuing the path of first setting up a process exchange platform and hoping that standardization (with regard to notation) will slowly but surely

occur in consequence. This strategy could be successful, solely on account of the power of accomplished facts. Facts are for example created by the “*Nationale Prozessbibliothek*” (National Process Library), which is in an advanced state of completion. The initiators of this endeavor are aware of the fact that standardization is unavoidable in the medium or long term. However, the intention is to let this standard take shape in an open process in which suitable methods and tools for the different aspects of the process management can establish themselves. Nevertheless, concerning the modeling notation, there has been an attempt on the level of local authorities to establish a common standard called FaMoS.

*Switzerland* chose to build on standardization by introducing the so-called eCH standards (see [www.ech.ch](http://www.ech.ch)). The eCH standards for business process management are divided into a framework, descriptive standards, reference directories and help documents. It has to be emphasized that eCH has specified BPMN 2.0 as descriptive language. The tools for BPMN use have not been standardized. Starting with the eGovernment strategy of Switzerland as a basis, the focus has been placed on customer-oriented governance. This means that the private business sector can conduct all communication with the authorities electronically; the authorities communicate with each other electronically; the general public can conduct important formalities with the authorities electronically (E-Government Strategie Schweiz 2007-2011, [91]). In the so-called prioritized eGovernment projects, the BPM standards are also used almost exclusively. With this approach, Switzerland has succeeded in setting up a BPM ecosystem. However, this cannot be considered to be equal to a successful implementation of the BPM approach. Instead, it provides the prerequisites for achieving organizational changes towards process orientation within the administrative units themselves. From the current point of view, this seems to be a very slow process.



**Figure 8:** BPM Ecosystem, in account with eCH-0138

In *Austria* the administration has the opportunity to enforce process standardization via regulations. Accordingly, for the purpose of concretizing general laws, process definitions are integral part of regulations. In addition, Austria continuously builds up competence centers for maintaining, and also modeling support processes. Consequently, these centers are in charge of process management and also of the roll out of specific support processes as for instance IT services.

#### 4.3.4 Tools

All three countries maintain different tools for supporting the BPM initiatives. *Germany* has introduced a so-called “National Process Library” (NPL). It is the first attempt at implementing a comprehensive cross-institutional and cross-level approach. A conscious decision was made not to enforce (standardized) restrictions with regard to tools or methods, in order to make sure that at least this aspect does not restrict the exchange of process expertise. The initiators of this endeavor are aware of the fact that standardization is unavoidable in the medium or long term. However, the intention is to let this standard take shape in an open process in which suitable methods and tools for the different aspects



of the process management can establish themselves. In this context the *xProcess* interface of XÖV (project for standardization of XML in public administration) deserves special mention. This interface makes it possible to integrate existing and future registers (for example, there are plans for connecting the federal state of Saxony and its process library to the NPL). Furthermore, all BPM tool manufacturers in the German-speaking region will implement this standard and integrate it into their tools. Through the bidirectional usage options for tools and manufacturers that this offers, the establishment of the BPM approach in public administration is supported significantly.

Now, after the first wave of standardization, *Switzerland* is following a logically consistent path by setting up and providing a process exchange platform to allow exchange of process expertise across all institutions and levels. The platform <http://www.ech-bpm.ch/de> (in addition to [www.ech.ch](http://www.ech.ch)) already makes some content available (project guidelines for BPM implementation, BPM starter kit, etc.). The focus lies on the distribution of the eGov BPM starter kit.

The development of eGovernment in *Austria* began in the nineties with the creation of portals and the introduction of business process management for finance. The initial purpose of eGovernment was the reduction of costs and the efficiency enhancement of the Austrian administration. As a result from introducing forms for administrative services, the first process repositories were build up. Today, Austria maintains portals for enterprises and citizens, so-called One-stop-Portals. These portals play an important role in facilitating process integration. They implement the previously discussed input variable concept and thus help to avoid media disruptions.

#### **4.3.5 Challenges**

The main challenge in all three countries is to increase the interlocking of business and IT. For *Germany*, it can be said that BPM is currently still, to a large extent, initiated either by the business or the IT departments of the individual administrations and, on the other hand, the support provided by the executive personnel is not adequate. The initiatives mentioned in this article do not change this basic finding in any way. Thus, Germany needs to

integrate the IT and business perspective accordingly. In *Switzerland* the continuous harmonization with the corporate architecture management, which falls in the area of responsibility of the Federal IT Steering Unit (FITSU), is of central importance. The current initiatives in the fields of BPM and architecture are mainly technology-driven and are only inadequately being supported by the management of the administrations. This is one of the possible reasons for the slow progress of BPM in public administration, as many executives do not give full commitment to such initiatives and BPM thus does not become a strategic initiative of the respective administrations. Furthermore, the BPM and architecture initiatives are being pushed by the Federal IT Steering Unit (FITSU), which is associated more with informatics than with management in the public administration. Especially, for *Austria* the interlocking of business and IT represents a significant challenge.

A further common challenge is given by the externalization of process expertise. As described in the process management system from Section 4.2.2, the employees of the administrative unit are actually both, affected parties and participating parties. Accordingly, they play a significant role. They provide expertise and are users of the respective systems. In the field of knowledge management in general and in process management in particular, the externalization of process expertise can be seen as a huge challenge.

#### **4.4 Discussion**

Summarizing the findings from the comparative analysis, we can make the following statements. The public administrations of all three countries have recognized the necessity of introducing BPM. The deviating strategies towards the implementation of BPM result from differences in culture, differences in complexity due to the overall size of the country, and the preexistence of different technical solutions. As far as it can be assessed from the current analysis, there are no indicators that one of the strategies will be more successful in the future. Rather, it can be expected that all three strategies will eventually result in the implementation of BPM in public authorities. However, some maturity levels can be only

reached, if according measures are taken. For instance, it is rather unlikely that the full potential is used if there is no opportunity for public authorities to exchange knowledge and experiences with regard to process management and optimization. Another aspect is given by the overall pace of the BPM implementation. From the analysis, we derived the following suggestions for accelerating the BPM implementation:

- *Germany:* Standardization might accelerate and improve the orientation of the current BPM initiatives in Germany. Since there are currently hardly any standards available, the process of voluntary agreement among the public authorities may unnecessarily slow down the success of the overall BPM initiative.
- *Switzerland:* Strengthening the business side could accelerate the BPM implementation in Switzerland. In particular, stronger impulses from the business side are needed. Consequently, the business must be accordingly integrated in the decision processes.
- *Austria:* Making the acquired knowledge available via process exchange platforms, could increase the success of Austria with respect to the interlocking of business and IT. As a result, the acquired knowledge will be readily available to a big audience.

Finally, we can use the analysis to derive some general success factors for the implementation of BPM in public administration. Note, that these findings are not representative, but rather represent first insights. Following the structure of the employed comparison criteria, the subsequent list summarizes the main hypotheses we derived from the conducted analysis:

- *Framework conditions:* The analysis suggests that the framework conditions do not have a big impact on the overall BPM success. Although, the three countries have similar conditions, they followed totally different strategies. A critical point in this context is the political backing. Without management commitment a holistic approach as BPM cannot be successfully implemented.
- *Input variables:* For the efficient execution of processes it is important to avoid media disruptions. Accordingly, it is significant that the process data is available in a digital format. Here Austria impressively demonstrated its success. However, the Austrian

success must be discussed against the background of the small size of Austria. In Germany, the enforcement of a consequent digitalization would be much more challenging.

- *Methods and standards:* Especially for administrations it can be a promising strategy to first focus on support processes. By harmonizing processes, which are shared by all administration authorities, BPM success can be effectively realized. Concerning standards, it is essential that partnerships among the different authorities can be easily and effectively established. The example of Switzerland has shown that standards can be actually the result of a bottom-up process. However, therefore it is of prior importance that the authorities are well connected.
- *Tools:* The most important characteristic of a tool is the support of the previously mentioned partnerships. Tools should not be a self-purpose, but consequently support authorities in exchanging ideas and insights.
- *Challenges:* The consequent interlocking of business and IT must be considered as an important factor for the BPM implementation.

Finally, the findings of this chapter have to be discussed from the perspective of some limitations. As discussed in Section 4.2, the methodology of this chapter falls in the category of qualitative research methods. Hence, our findings are not representative. The limited number of cases and interviews do not allow us to draw generalizable conclusions. However, the goal of qualitative research is of a different nature. As the insights in the research field of BPM in public administration are currently very limited, the findings of this chapter represent an important first step. As a result, the insights from this chapter have implications for both, theory and practice. In further research our findings can guide future qualitative research initiatives or they could form the basis of a quantitative study. Public administrations could use the identified factors for complementing their BPM implementation strategy.

## **4.5 Conclusion**

In chapter four we investigated the BPM implementation in the public administration of Germany, Switzerland and Austria. We conducted 13 interviews and compared three case studies with a set of systematically derived comparison criteria.

We found that the public administrations of all three countries have recognized the importance of BPM. Due to differences in culture, size, and technical preconditions, all three countries pursue their own BPM implementation strategy. Currently, Switzerland is ahead of Germany and Austria with regard to standardization. Germany, on the other hand, builds on an interorganizational platform including a wide range of free tools for process modeling. Austria is more focusing on the technical implementation and the harmonization of support processes. As a result, they currently have reached the highest degree of process harmonization.

Currently it is not possible to predict which BPM approach will be potentially more successful in the long run. In general, we concluded that political backing is one of the main factors for BPM success. Further, partnerships among the administration authorities represent a key point. Only by facilitating partnerships, a holistic management concept as BPM can be successfully implemented in the organizational environment of public administrations. Here, tools can effectively support such partnerships by offering social network components in the context of platforms. Although, the findings of the presented research are not generalizable, they might serve as an important guidance for research and practice. Due to the lack of research in that field, this work represents a first step towards an understanding of BPM in public administrations.

In future research, we plan to extend our study with cases from other European and also Non-European countries. We further strive for increasing the total number of interviews such that our findings reach a higher degree of external validity. Finally, we will continue to investigate the three presented cases in order to learn how these BPM initiatives evolve.



## **5. Barriers and strategies of process knowledge sharing**

### **5.1 Introduction**

Nowadays business process management (BPM) is integral part of many organizations in the private sector. In this context, it is typically understood as a holistic management approach which aims at aligning business processes with the goals of the organization [52]. However, if we consider the implementation and maturity of BPM in public authorities, this does not hold true to the same degree. Although continuous budget cuts and rising demands concerning flexibility and modernization also raise the interest for BPM in the public sector, the actual implementation of BPM is still in its early stages [9]. In addition, organizational idiosyncrasies such as the federalist structure impede a straightforward introduction of BPM into public sector organizations.

One of the biggest challenges in public organizations is the exchange of process knowledge that has been collected and documented in the individual authorities [36, 92]. The importance of this knowledge transfer can be, for instance, illustrated by the German municipalities and the services they provide: German municipalities typically maintain more than thousand interconnected and interdependent service processes [9]. Although these services are offered by different authorities, there are considerable overlaps with regard to how these services are provided. In such a setting, an effective sharing of process knowledge has the potential of significantly supporting authorities with lower maturity in identifying optimization opportunities. The exchange of artifacts such as process models or process maps enables other authorities to gain detailed insights into the operations. However, process analysis and optimization is currently conducted on a municipal level. Often, municipalities simply do not recognize the benefits of sharing process knowledge, or they are afraid of disclosing weaknesses of their processes.

In prior work, the problem of knowledge sharing in public organizations has been studied from different perspectives (e.g. [36-38]). Nevertheless, there is no research paper that

directly addresses the specifics of sharing process knowledge so far. As pointed out, process knowledge allows the recipient to gain rich insights about processes and work procedures. It may, however, also disclose weaknesses and poor solutions. Hence, process knowledge must be considered as particularly critical and sensitive. Recognizing the importance of sharing process knowledge in public authorities, this chapter investigates this phenomenon in detail. In particular, we conduct a qualitative study in order to investigate how process knowledge sharing is perceived and implemented in public authorities. Our study is based on a set of interviews with employees from different positions from German authorities. Our contribution is a conceptual framework that reveals key factors driving and inhibiting the successful sharing of process knowledge in public organizations.

The rest of the chapter is structured as follows. Section 5.2 introduces the background of our research. Section 5.3 gives an overview of our research methodology and explains the data collection procedure. Section 5.4 presents the results of the study and explains the derived framework in detail. Section 5.5 discusses the implications of our work before Section 5.6 concludes the chapter 5.

## **5.2 Background**

This section discusses the background of our research. First, we introduce the concept of business process management. Afterwards, we present the findings from prior research on knowledge sharing. Third, we elaborate on the specificity of process knowledge.

### **5.2.1 Business process management**

A business process is typically defined as a sequence of activities that is conducted to transform an input into some business-related output [65, 93]. Business process management is then understood as the set of all activities that are related to the management of business processes. These activities are often organized in the context of a life cycle including the phases analysis, design, implementation, monitoring, and



evaluation [54]. The artifact of a business process model plays an important role in this context. Thus, process models are used for documenting the as-is processes and form the basis for redesign and evaluation endeavors.

Often, companies do not only use process models for analyzing single processes, but they systematically document large parts of their organization. Such process model initiatives may result in a hundred or a thousand process models [62]. The resulting process model repositories are not only valuable for the organization itself, but may, in case of similar structures, also support other organizations in improving their operations. Particularly in the public sector, where many authorities offer similar services, process models and the associated process knowledge represent highly valuable artifacts [9].

### 5.2.2 Knowledge sharing

The sharing of knowledge has often been emphasized as important factor for increasing organizational performance and efficiency [37, 71, 94, 95]. Consequently, factors influencing the effective sharing of knowledge have widely been investigated from different angles (e.g. [71, 94, 96]). Many works also exclusively focus on the public sector [97, 98]. The results of these studies suggest that the following factors are most influencing:

- **Trust:** Many researchers have demonstrated that people are sharing knowledge when the interpersonal relationships are strong and a high sense of community exists within the organization [92, 99]. The trust in the people that receive and benefit from the shared knowledge has shown to be particularly important in this context. While trust represents one of the most important drivers for facilitating knowledge sharing, studies have also shown that it is the hardest to overcome [98].
- **Decision structures:** Centralization has proven to be rather ineffective for knowledge sharing [38, 39]. Due to the lack of autonomy in the hierarchy, people cannot flexibly react to new demands which are concerned with potentially sensitive data. As a result,

organizations with more autonomy have turned out to achieve a better performance [100].

- **Incentives:** Incentives can be discussed on the individual and the organizational level. A study from Bock et. al. [92] shows that monetary incentives may have a negative effect on knowledge sharing behavior. Organizational culture that values knowledge sharing behavior turned out to be much more successful in this regard [97, 101, 102].
- **IT utilization:** The use of IT has a significant influence on knowledge sharing behavior [96]. When the IT landscape is old, employees may lack the means and also the general skills of how to effectively share their knowledge. Hence, IT maturity plays an important role in this context.

Although many authors emphasize the differences between public and private sector organizations, such as deviating legal and political conditions [1], the majority of these factors apply to both private and public organizations. However, the introduced findings relate to a general type of knowledge that does not necessarily allow the recipient to gain deep insights into the organization. Hence, in the next section, we point out the differences between general knowledge and process knowledge. Moreover, we highlight why the sharing of process knowledge requires further investigation.

### 5.2.3 The specificity of process knowledge

In general, knowledge is typically subdivided into tacit and explicit knowledge [36, 96, 102]. Explicit knowledge is understood as something that can be documented in a written form and does not require explanations on a deeper level. By contrast, tacit knowledge is hard to formalize as it is connected with the individual experience of a particular person.

Investigating the nature of process knowledge in more detail, it becomes obvious that it includes both facets. Many BPM initiatives result in a process models that formalize the operations of the respective organization. These process models can be considered as explicit knowledge. However, process knowledge may also include best-practices of how BPM can be introduced into an organization or how employees must be trained. Such

aspects are typically much harder to formalize as they require a careful consideration of the present circumstances. Thus, the encapsulation of tacit and explicit knowledge represents a basic characteristic of process knowledge which also highlights its value.

The most important characteristic that sets process knowledge apart from other types of knowledge is its criticality. As process models represent organizational procedures, they may reveal considerable weaknesses of the organization. While this exposure could lead to an eventual improvement, there is a huge trade-off between the opportunity to improve and to reveal that processes are implemented in a non-optimal or even poor manner. Hence, the sharing of process knowledge has the potential to greatly improve the organization, but is connected with a high degree of self-exposure and risk. To investigate how this hurdle can be overcome is the main goal of this chapter.

### **5.3 Research methodology**

Since there is only little research and understanding on sharing process knowledge across public authorities, we apply a qualitative research approach. In particular, we choose the *Grounded Theory* method. Grounded Theory was first introduced by Glaser and Strauss and supports the inductive discovery of an underlying theory that is grounded in data [40]. As stated, the method is beneficial for phenomena for which little research has been conducted. In our study, we employed the “Straussian” guideline of Grounded Theory [41] because it encourages the systematic analysis of data from interviews and the identification of essential relationships contributing to our phenomenon. In the following sections, we discuss how we acquired the interview data (Section 5.3.1) and how we analyzed this data in order to derive the final theoretical framework (Section 5.3.2).

#### **5.3.1 Data collection**

For our study, we chose 15 German authorities with varying BPM experience and conducted semi-structured and in-depth interviews with participants from different administrative levels. In preparation for the interviews, we developed an interview

guideline covering the topics *BPM context, motivation, risks, consequences, and risk mitigation* (Extract from the questionnaire see Appendix, chapter 8.2). Each interview had an average length of 40 minutes and was transcribed afterwards. To maximize our outcome with respect to the observed phenomenon, we chose participants from different job positions (employee vs. management), different functional units (organization vs. IT), size and hierarchical level of agency (local vs. state vs. federal), which is inline with the theoretical sampling approach of qualitative research methods [41]. For a full overview of the participants, we refer to Tab. 4.

**Tab. 4:** Interview participants

ID	Age	Job Position	Functional Unit	Size of Authority (Employee 2012)	Authority Level	BPM Exp. in Years
1	40-49	Lower Management	Organization	845	Local	5
2	50-59	Lower Management	Organization	1300	State	10
3	40-49	Lower Management	Organization	422	Local	1
4	30-39	Lower Management	Organization	8000	State	5
5	40-49	Lower Management	Organization	670	State	8
6	30-39	Employee	Organization	1500	Federal	2
7	40-49	Middle Management	Organization, IT	309	Local	-
8	40-49	Employee	IT	514	Local	11
9	40-49	Middle Management	Organization	2656	Local	9
10	40-49	Lower Management	Organization	346	Local	14
11	40-49	Middle Management	Organization	16420	Local	-
12	30-39	Employee	Organization	2253	Local	1
13	40-49	Employee	Organization	1600	Federal	-
14	40-49	Employee	IT	2600	Federal	3
15	30-39	Employee	Organization	186	Local	-

### 5.3.2 Data analysis

For the data analysis, we employed the Grounded Theory approach of Strauss and Corbin [41]. This procedure consists of three separate and interactive steps, i.e., open coding, axial coding, and selective coding. In the following paragraphs, we explain the steps in more detail and discuss how we applied these steps on the interview material.

**Open coding:** The Open coding phase is an analysis procedure with the goal of identifying concepts and categories in the data. In this context, the concepts form the building blocks of the resulting theory. Thus, concepts describe thoughts, events, happenings, and actions that are related to the phenomenon and are associated with the text for further analysis. Typically, concepts are grouped together to abstract categories. A category can subsume several concepts and is closely related to the investigated phenomenon. Accordingly, categories encompass concepts that are related in nature or related in meanings. Based on the methodological framework, we analyzed the interviews by going through each of them and assigning a concept to sentences and paragraphs that represented content and the underlying meaning. To keep track of concepts and categories, we employed the software tool ATLAS.ti, which is commonly used for this type of analysis. For consistency reasons, we iteratively evaluated the concepts and systematically sorted out redundant or unfitting concepts. For the derivation of categories, we went through the concepts and refined them to those categories that are found to pertain to the investigated phenomenon.

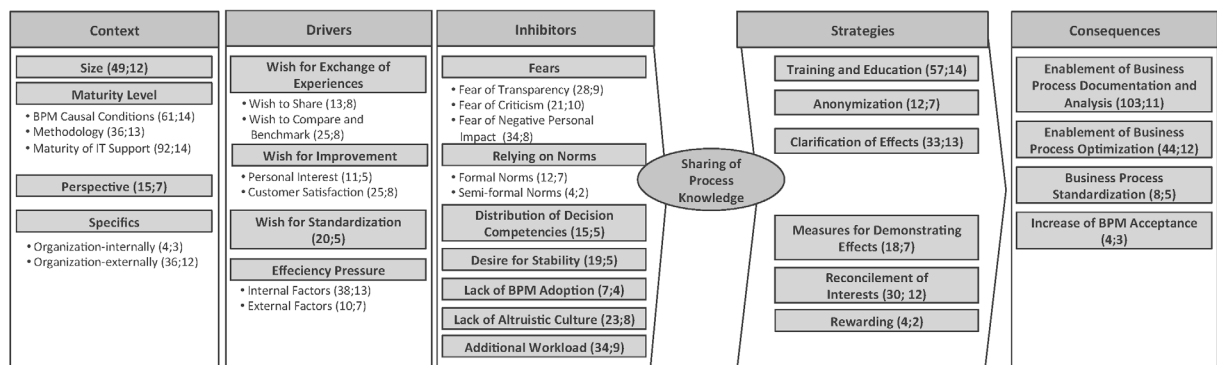
**Axial coding:** Axial coding is used to identify connections between the categories accordingly organizing them in a new way. In order to accomplish this, we used the general coding paradigm of Strauss. It identifies four main groups of categories, i.e., context, causal and intervening conditions, strategies and actions, and consequences. As we are interested in specific conditions driving or inhibiting the investigated phenomenon, we adapt the coding paradigm and explicitly interpret causal and intervening conditions as drivers (conditions with a positive effect) and inhibitors (conditions with a negative effect). Afterwards, we assigned each category to one of the main groups by deciding on the role of this category with respect to the phenomenon.

**Selective coding:** Selective Coding describes the process of selecting and focusing on specific core categories. Thus, a core category describes a central concept of the phenomenon around which all other categories are subsumed. It aims at the refinement of the previously defined categories to a set of relevant categories. In this step, we went through the interview material in several iterations and derived relevant categories that are

related to the phenomenon. Finally, we derived the theoretical framework from the material that explains the phenomenon of process knowledge sharing in public administration.

## 5.4 Research findings

As a result from the application of the Grounded Theory method, we derived a conceptual framework that identifies factors influencing the sharing of process knowledge. Figure 9 illustrates the derived framework.



**Figure 9:** Framework for sharing of process knowledge

It includes the main categories, namely, context conditions, drivers, inhibitors, the phenomenon itself, the relevant strategies to improve the willingness to share, and, finally, the consequences resulting from process knowledge sharing. The values in the brackets next to each aspect denote the total number of mentions in the interviews as well as the total number of occurrences of one specific concept among all interviews. In the following subsections, we explain the contents of the framework by using insights from our interviews.

### 5.4.1 Context

The context of process model sharing describes a set of circumstantial properties that relate to the different authorities. The context of process knowledge sharing is classified into four main categories:

- **Size of the organization:** Most of our interviewees explicitly emphasized the role of size and maturity and their influence to share process knowledge: “There are seven or eight people involved in Cologne. In Siegburg maybe only two.” Depending on the size of the organization, the opportunities for process management are more evolved. Therefore, the necessity to prioritize the processes, which are to be documented, is much higher in smaller organizations due to a lack of resources: “Well, currently we just randomly pick processes to document them (...)”.
- **Maturity level of BPM in the organization:** The methodological possibilities depend on the maturity level of the organization or the BPM initiative: “Then it may be, however, that you do one thing manually, and the other one with software support (...)“ Likewise, the technical support options in the organization are also dependent on the maturity level and therefore differ in every organization. 14 out of 15 interviewees emphasized this correlation in their answers: “We just finished an IT architecture project which aimed at ... determining where we have to change our IT architecture, where to adapt it, and ... which business functions we have, and how we are supporting them.”
- **Perspective of processes:** To a large degree, the result of a process initiative depends on the organizational perspective on BPM. For instance, this is reflected by the acquisition of certain BPM tools for specific, individual or mutual purposes: “Nothing changed (introduction of BPM, author’s note). We installed ARIS, but no one worked with it.” At the same time, the different perspectives lead to different requirements and also results: “That we sometimes have different views on a perfect or optimized process than the user departments ...”.
- **Organizational specificities:** The inclusion across organizations was much more important to our interviewees for the specificity of the BPM than the intra-organizational specificities. When introducing BPM into a multilevel authority, external factors influence the process management within the organization: „ ... that you say: Yes, our dishes are completely different, we have our departmental competence” / “... we're [finally] a state authority.”

To summarize, we identified particularly effective requirements for the sharing of process knowledge: the size of the organization (49 mentions), the maturity of the organization and in particular the IT support (92 mentions) as well as the involvement of the organization and thus the external influences on the organization (36 mentions).

#### 5.4.2 Drivers

Based on the interviews, we identified different drivers that positively influence the process of sharing knowledge. According to the number of mentions in the interviews, the interviewees evaluate them as being equally important. However, there are specific aspects of each driver that are discussed as follows:

- **Desire to share experiences:** Contrarily to [39], it is surprising that more than half of our interviewees addressed the sharing of experiences: "Well, I do think ... from a central point of view, we must succeed that these same processes are not only known by project people and remain hidden, but are made available to a large number of people of the authority." In particular, the comparison or benchmarking (25 mentions) was named as a strong motivation: "... concerning the comparability or the exchange with others ...that such transparency is always a good starting point, that you get a hint why don't you do it this way ...".
- **Desire to improve:** Authorities still have a self-image as administrative intervention and administrative enforcement. Therefore, it is surprising that the interviewees emphasized the importance of customer satisfaction (25 mentions): "...improving customer service - of course, we are customer oriented ...".
- **Desire to push standardization:** The desire for standardization is based upon the idea to handle processes and procedures in a consistent manner: "... basically, I would say, the process seen from a legal perspective, to issue a building permission, is actually the same everywhere." The process of knowledge exchange with other institutions represents an essential requirement to achieve standardization. Nevertheless, our interviewees pointed out that the possibilities to preserve the individuality of an institution should not be ignored: "And somewhere there are also opportunities to say,



okay, that may of course also be supported by supplementary documents, where there is no predefined format.”

- **Demand for efficiency:** The demand for efficiency has built up in recent years, particularly pushed by external factors such as the brake on debt [103] and the elimination of the payment in the context of the Solidarity Pact [104]. Surprisingly, internal pressure for efficiency was mentioned 38 times: „And clearly, the comparability creates a certain competition.”

### 5.4.3 Inhibitors

In addition to the drivers to share process knowledge, the analysis of the interviews revealed factors, which negatively influence the willingness to share process knowledge. We identified seven categories of inhibitors. The following list represents those inhibitors, which significantly differ from the inhibitors described in literature:

- **Fear:** Concerning the fear of transparency and criticism, our results are similar to [36]: “The moment I publish something, I make myself vulnerable.” Surprisingly, more than half of the interviewees fear personal consequences (34 mentions): “It’s always about saving resources.” These fears lead us to the conclusion that deeper cultural and socialization problem exist.
- **Hiding behind formalities:** Generally, this inhibitor was to be expected [105], but relatively few interviewees (four interviews, twelve mentions) referred to formal or semiformal norms: “... they are hiding behind any laws. / We, as the authority, are referring to that, to say, that we are working based on legal requirements [...] that we must fulfill.”
- **Allocation of competences and the lack thereof:** Both the analysis of processes as well as the employment of the inherent identification of problems is hampered by insufficient competence regulations [39]. “There are official instructions and at the end the rest is executed by the responsible manager.” And “The hierarchy level above does not want to deal with these problems.” Nevertheless, this is not a major inhibitor (15 mentions, five interviews).

- **Conservative behavior pattern or search for stability:** As stated above, the sharing of process knowledge is accompanied by the fear of criticism and change. This fear results in a conservative pattern of behavior that is clearly connected with the need for stability, "So in my experience, people working in the public administration are often people who are looking for stability." The strong desire for stability was mentioned as another inhibitor influencing the exchange of process knowledge (19 mentions in 5 interviews).
- **Inadequate adaptation of the BPM approach to public authority:** This inhibitor is not surprising due to the generally low BPM maturity level of public authority [58, 106]: "So we do not have a standardized procedure (...)". However, only four interviewees mentioned this inhibitor seven times.
- **Cultural defects:** Regardless of the domain, selfless behavior is an optimal condition for knowledge sharing [97, 98, 101, 102]. In more than half of the interviews, a lack of these cultural conditions was identified (23 mentions). One example stated by our interviewees is the arbitrary delegation of conflicts („which in turn leads to the delegation of conflicts“). The delegation shows that the employees of an authority are not willing to constructively deal with change and knowledge sharing. Furthermore, the interviewees stated that employees of authorities deliberately held back changes in order to consolidate their own position within the organization: „ ... a department likes to skip changes or improvements ... in the sense of protecting vested rights or in the sense of safeguarding interests“.
- **Knowledge sharing causes additional effort:** This inhibitor was identified most frequently (in nine interviews with 34 mentions). Given the relative lack of economic thought and action, the importance of this inhibitor to the interviewees was unexpected: "This has proved to be too complicated, because we simply could not provide the resources permanently."

In summary, the fear of personal consequences, along with cultural deficits and the expected additional effort by sharing knowledge represented the most significant inhibitors.

#### 5.4.4 Strategies

To improve the process of knowledge sharing in the public sector, we identified several approaches:

- **Education and training:** As expected, education and targeted training on BPM represent an important approach to reduce the identified inhibitors of knowledge sharing and improve the effect of the driver. In almost all interviews (14 out of 15) and 57 mentions, education and training constitutes the best approach to improve the sharing of knowledge: “Yes, training is self-evident for us.”
- **Anonymization of shared knowledge:** Another common measure arises from to the anonymization of the shared knowledge. The anonymization impedes the identification of the author. Therefore, the author is not exposed to criticism: "We have the reference processes anonymized so that there are no more names for example." In addition, the German Data Protection Act requires the anonymization: "Of course, no personal data should be included. That is even a legal requirement.“
- **Transparency about the consequences of knowledge sharing:** If the consequences of sharing knowledge become more transparent, it increases the participants’ willingness to share knowledge: “Transparency is one thing. It works if you manage to integrate the employees. That means to let them participate in the process as well, explaining what we were doing, how we do it, and where you want to go. ”
- **Piloting:** Two measures have been proven effective to encourage process knowledge sharing: providing information and piloting. In so-called pilot projects, a new concept is first tentatively placed in one or more departments. This way, positive experiences can subsequently be communicated: “We are now in the implementation phase again. There is a pilot project, which is running successfully in some departments.” In this context, it is important to highlight the positive achievements and benefits of knowledge sharing in order to create a wide acceptance within the authority.

- **Reconcilement of interests:** It must be clear to the participants what happens to the knowledge they are sharing and what to expect in return. This cost benefit analysis was mentioned 30 times in twelve interviews.
- **Incentive schemes:** The identification of incentive schemes as a strategy to improve knowledge sharing was quite unexpected [92, 97, 102]. However, this strategy was mentioned only four times in two interviews. [5] confirms that this strategy is unusual for the public authority.

Overall, it should be noted that the training of the employees significantly increases the acceptance of the phenomenon. At this point, it is important to discuss the advantages and disadvantages of process of knowledge sharing with supporters and opponents alike.

#### 5.4.5 Consequences

The sharing of process knowledge is not an end in itself. Therefore, the expected consequences of the sharing are interesting. Starting with the weakest effects, we will consider these consequences in more detail below:

- **Improved acceptance:** The process of knowledge sharing also certainly leads to an improved acceptance of BPM in the public authority, especially when the consequences listed below will actually occur. However, only three interviewees mentioned the improved acceptance of BPM (four mentions).
- **Standardization:** Another implication of process knowledge sharing is a rising interest in business process standardization. Business process standardization mainly involves the unification of processes aiming at the creation of a transparent and efficient process landscape. Surprisingly, standardization was mentioned eight times in five interviews and does therefore not constitute the main expectation.
- **Documentation and analysis of processes and optimization:** The improved fundamentals and skills for documentation and analysis (103, 11) as well as the optimization of processes (44, 12) provide the strongest implications for the process of knowledge sharing. These implications also provide the basis for further

standardization of processes. Finally, these implications correspond to the current maturity of the BPM in the public authority, where the focus is on initial documentation of processes and their optimization.

## 5.5 Implications

Our study provides new findings concerning the factors influencing the sharing of process knowledge and highlights the need for further research. We first discuss scientific implications before we highlight the implications for practice.

With regard to *scientific implications*, we can state that our study demonstrates the influence of the factors trust, decision structures, incentives, and IT utilization as reported in previous studies [36, 37, 97, 98]. However, it also emphasizes the specifics of sharing process knowledge. Our study shows that the revelation of weaknesses and the associated fear of criticism represent a particular obstacle. In order to reduce this fear, cultural changes as well as measures facilitating individual development are necessary. Hence, the allocation of responsibilities will significantly influence the willingness to share process knowledge. [38, 39] found out that the centralization of responsibilities negatively influence this willingness. Authorities increasingly set up BPM competence centers [5] despite the heterogeneity of authorities in terms of size and despite the low degree of BPM maturity. This conflict should be more thoroughly examined in future research.

With respect to *practical implications*, we found out that the willingness and ability to share process knowledge largely depends on the size and maturity of the organization. While the size of public organizations can only be partially influenced, the maturity can be influenced by means of the strategies identified in this chapter, especially by means of trainings. For a successful BPM (based on a exchange platform), investments in training and education are required.

The driver "desire to share experiences" should be given more attention in the practical work. As argued by [107], the necessary confidence can be achieved by increased

connectivity in closed communities. Therefore, it is necessary to continue to create a regulatory framework, to further delineate adequate benchmarks in order to increase the willingness to share process knowledge, as started by [108]. A first practical implementation is already available: the regulatory framework of “*Nationale Prozessbibliothek*”.

The identified inhibitor „fears of personal consequences“ can only be reduced medium term by breaking down cultural deficits. Moreover, the feared „additional effort“ through the knowledge sharing (provision) can only be reduced by continually working out and communicating the mutual benefits of knowledge sharing. The driver customer orientation was quite unexpected and should be investigated in future research.

## **5.6 Conclusion**

In chapter 5, we addressed the problem of process knowledge sharing in public organizations. We conducted 15 interviews with representatives of various German authorities and analyzed the interview data using the qualitative research method Grounded Theory. As a result, we derived a conceptual framework showing relevant conditions, inhibitors, and drivers for process knowledge sharing. The results demonstrate that the revelation of weaknesses and the associated fear of criticism represent the most important obstacles. In order to reduce this fear, the implementation of cultural changes is one of the most important aspects to be addressed.

In future research, we plan a quantitative study to evaluate the findings and to identify the most influencing factors of process knowledge sharing in and between organizations.



## **6. Federal Information Management – Context and Effects**

### **6.1 Introduction**

The provision of information challenges both the private and the public administration. In our information society, the information receivers are often exposed to information overload. To ensure information processing, intelligent selection and evaluation mechanisms are crucial. This selection and evaluation is difficult for both the information provider and the information receiver, especially for public administrations, which provide information, which has to be reliable to the citizens and to the private sector [105]. The information providers have to provide the right information for the right receivers at the right time at the expected quality. The essential quality criteria for information are timeliness and reliability. In order to meet these criteria, the definition of quality standards and their application is necessary.

Information about administration processes can be harmonized by means of an overarching federal information management (FIM) between the federal level, the federal state level and the municipal level (on a voluntary basis). The definition of editorial processes plays a central role in order to ensure the quality and availability of relevant information as well as the harmonization of the structural basis for deployment and retrieval of information. Three major information domains of public administration must be merged and linked in a holistic approach by mapping contexts and their provision of information management services. The corresponding approaches in Switzerland are equally transferable to Germany [109, 110].

The starting point is the provision of services of the public administration (including administrative services): outside the administration for citizens and companies, as well as within the administration to support or accompany services. An application form usually triggers the process of generating services.



The components services, forms<sup>23</sup> and processes of a FIM represent individual information domains, which satisfy together different information needs at a guaranteed quality level. The different requirements in the three information domains can be attributed to different conditions in the administrations. Different goals also affect information needs and their granularity.

In a co-designed approach, it is useful to define quasi-standards on the implementation level, and to impose or recommend standards, which have been elaborated top-down across the different administrative levels. In order to take account for the different levels of detail, standardized components with different levels of details have to be available for the different information domains (components).

The focus of the chapter at hand is the representation of the interaction of these three components in a FIM. The aim of this chapter is therefore to show how the approach of a FIM links the different information needs and can effectively provide adequate information.

From a methodological perspective, this research focuses on design science. The epistemological aspect, namely the evaluation of the developed concepts, plays a minor role. Therefore, this research is based on the paradigm of design science, which has recently been predominantly discussed based on Hevner et al. [29, 30].

Our research questions are: (1) Which information is required? (2) Which relationships and dependencies exist? (3) Who provides which information in which way? (4) How can such a structure be gradually be refined and integrated? (5) What are the benefits of FIM?

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<sup>23</sup> For the FIM context at hand, we define "form" in a broad sense, i.e. forms can be (i) input documents such as application forms, (ii) output documents such as administrative decisions, or (iii) output documents of other services such as identity cards.

To answer these questions, this chapter is structured as follows: In chapter 6.2 related work is discussed. Chapter 6.3 gives an overview of the different contents of a FIM. Chapter 6.4 describes which standardized information (in which components) is provided and which relationships exist between the various kind of information. Finally, in chapter 6.6 we discuss the findings. Chapter 6.7 summarizes this contribution and gives an outlook on future work.

## 6.2 Literature Review

The interaction of information or data and business processes is the subject of an extensive research tradition. In IS research in the field of *Business Process Modeling* [111] or *Reference Modeling* [50] many scientists examined how the flow of business processes and the required information and data can adequately be represented and designed.

This research efforts concerning (business) process modeling resulted in various concepts and modeling techniques to represent processes and information objects and to map them to each other [vgl.112]. Many of these modeling techniques allow representing different views to differentiate between the specific information needs of different user roles. A better understanding of this specific information needs leads to an improved *information logistics*.

The concept of information logistics is often discussed in the field of Master Data Management [113]. It includes components and processes for distribution and replication of master data elements. For the chapter at hand, the challenge is to make the master information available in a central repository and in case of updates or corrections to ensure the distribution of the updated version of the master information. Master information is centrally prepared, but may be adjusted as needed for a particular application. Organizational measures such as version control must be taken to identify master data and their possible adjustment. At the same time, the knowledge about the multiple use of master information can support the standardization of data definitions and thus improve the efficiency of information processing. In particular, the design of high quality process

structures requires the optimization across all information objects and their standardization. Therefore, this standardization should be promoted [114]. However, only those processes and systems should be centralized which fulfill the same tasks on the same execution level. The underlying IT support needs binding and uniform exchange formats, data structures and interfaces [115].

Reference Modeling provides a concept for this project, which structurally supports harmonization and interoperability by showing general examples of entire industries and requirements for data models, process models, organizational models and other models [vgl. 116]. The goal of these reference models is to meet the various requirements of different stakeholders and harmonize and integrate all these information requirements into one model.

The findings from Business Process Modeling can be transferred to the field of public administration. In both fields the process-oriented view becomes more important than the function-oriented view. Carrier of information objects such as forms or notices can be assigned to a particular administration process by merging the process view and the object view [3].

### **6.3 Description of the components**

The main principle of a FIM is to harmonize and integrate the three services modules, forms and processes into one entity (Figure 10). The different requirements in the three information domains can be attributed to different conditions in the administrations. In order to take into account the different levels of details of the information needs, FIM modular components are available as standardized items.

The FIM modular components of the information domains are available at different levels of details in order to meet the different information needs. Further, they are standardized to allow the linkage between the FIM modules with each other.

The FIM Logic forms the core concept for harmonization. This logic specifies the FIM modules, their linkage and rules to define the interaction among the FIM modules. The FIM Tools consist of concepts, methods and standards used to create, maintain and use FIM content. The FIM Kit comprises all structural components needed to create FIM content. The kit consists for example of wiki modules, form fields, process elements as well as linkage rules. The FIM Kit provides the basic FIM content (FIM modular components) ready to be combined in as many ways as possible and as easily as possible reusable. For example, the FIM modular component “forms” consists of LeiKa<sup>24</sup> modules, form fields, form field groups and rules.

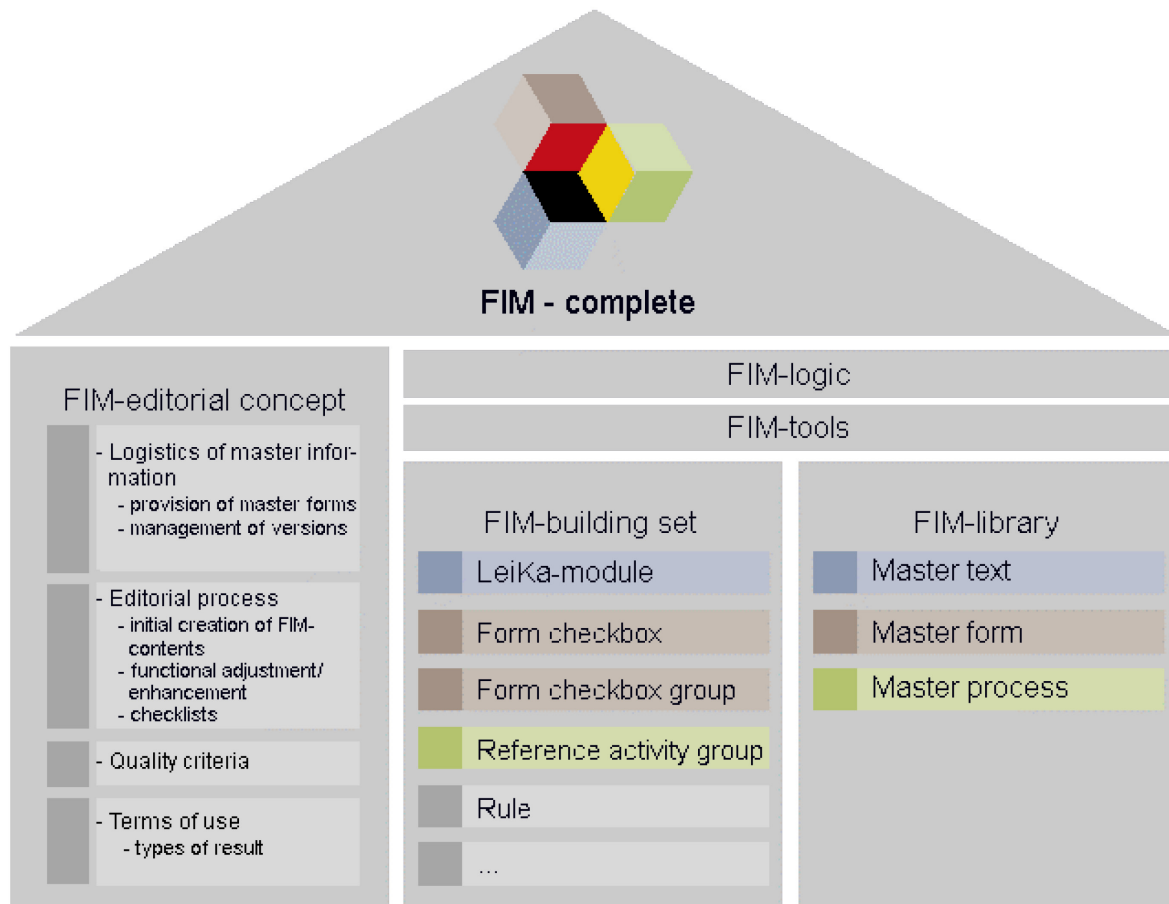
For the FIM component "forms" that are, for example, the modular elements of fields, field groups and rules. Further, an unlimited number of fields and field groups can be included in the master form<sup>25</sup>.

Content for the FIM Library can be created by means of the elements of the FIM Kit. These are for instance master forms, which consist of form fields, form field groups and linking rules based on federal law or federal state law. The FIM Editorial Concept defines user roles for FIM, which elements have to be maintained and can be used and how to manage the creation, maintenance, access or the quality assurance.

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<sup>24</sup> LeiKa = in German “Leistungskatalog”: inventory of services

<sup>25</sup> It's a sample without formatting and labelling of the local administration



**Figure 10:** FIM House

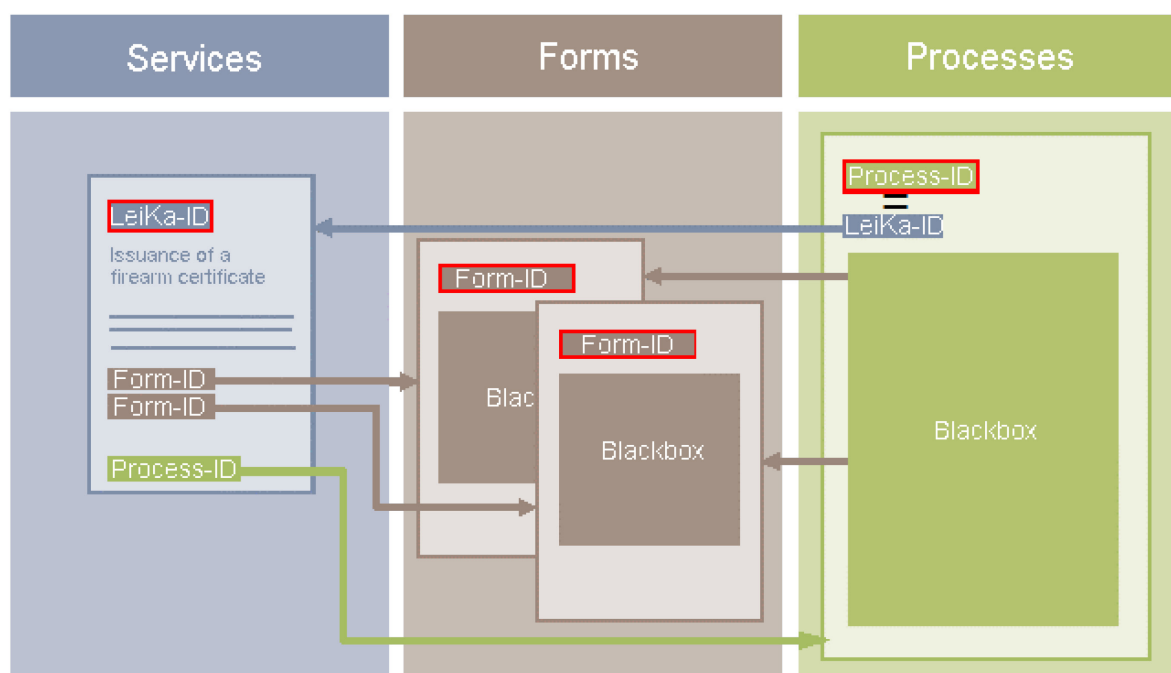
## 6.4 Interaction of the modular components

One of the major goals of the FIM consists not only of the provision of information but also to link this information across the modules “Services”, “Forms” and “Processes”. The level of detail of these linkages will be continuously refined in three stages during the implementation of the concept in practice.

In the first stage, the modular elements are mostly isolated from each other (Figure 11). Forms and processes are a black box for each other. Only the services are standardized which allows an explicit matching of “Forms” and “Processes”. The element “Services” (LeiKa) includes the description module “Necessary Documents” and “Forms” which lists

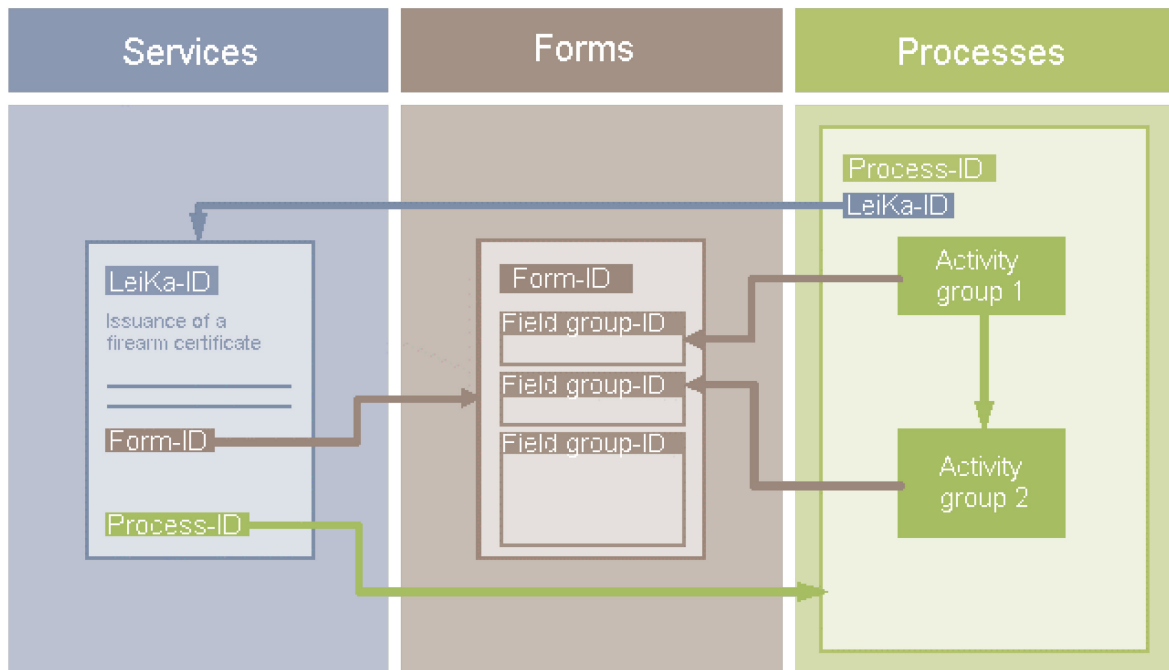
all documents and forms. The description of services for the application for issuing a weapon, for instance, includes in the first stage a reference to all necessary documents (application form, etc.) in form of an ID form instead of text.

Similarly, the service specification contains a reference to the corresponding process by means of a process ID. Further, the process references the respective service by means of the LeiKa ID.



**Figure 11:** Interaction of the FIM modular elements during the first stage

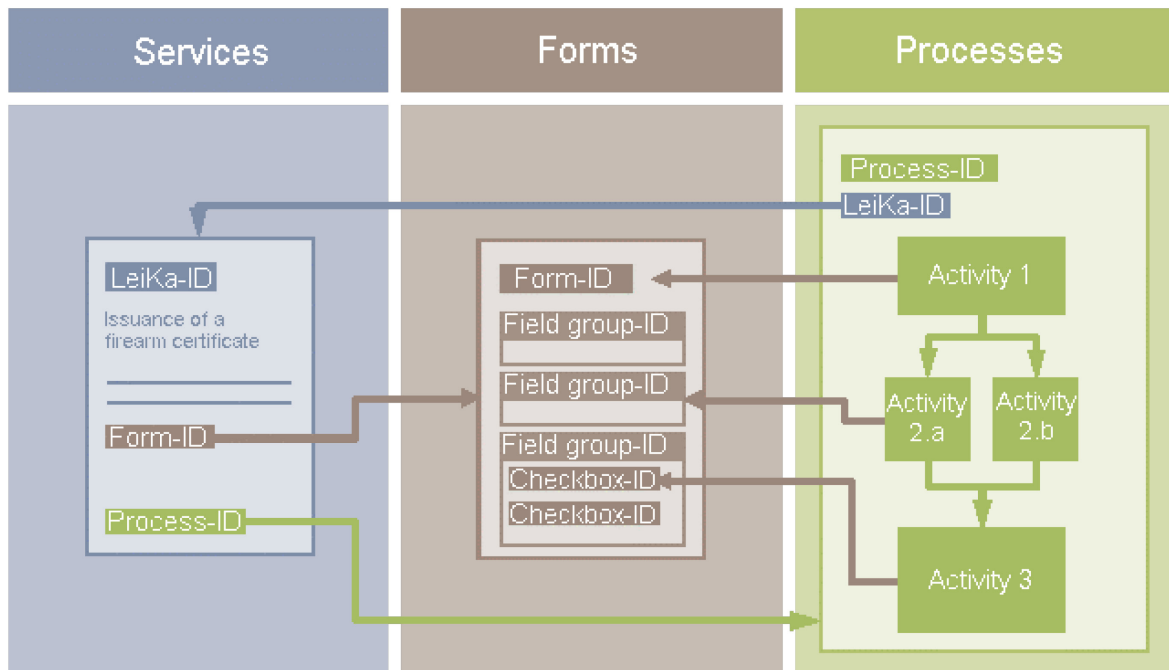
In the second stage, the details of the black boxes are shown and the linkages between the components are specified in more detail (field group IDs, activity IDs; Figure 12).



**Figure 12:** Interaction of the FIM elements in the second stage

In this stage, the recurring combinations of field groups (e.g. the address, consisting of name, street, postal code and City) and activities (e.g. the processing of incoming mail, consisting of opening, scanning, detecting the metadata, and forwarding to the person in charge) have to be associated with the LeiKa. At the same time, it is a requirement in the process view that the form fields needed for specific activity bundles can clearly be identified. This means that for the processing of incoming mail the field group IDs and their corresponding field groups are saved in the metadata of an activity bundle.

In the third stage, the linkages between the components are also specified in the field level wherever necessary and appropriate (Figure 13). The extent to which these field-based linkages are feasible and how they can be implemented in detail will be shown by the application of this framework in practice. Across all stages of development the linkages between processes, services and LeiKa IDs are stored in the Process characteristics.



**Figure 13:** Interaction of the FIM elements in the third stage

For the implementation of this concept, a data model was developed, which reflects the described relationships between the FIM components and represents the core of the FIM logic. Using the data model, one can link the single service descriptions and their corresponding forms and documents as well as the corresponding process. On this more detailed level, each activity bundle respectively specific activities of a process will be matched to the corresponding form field groups and form fields. One example is the matching of a responsible person to the last name and address of an applicant. The matchings are realized by means of IDs, which are stored in the metadata of the FIM components.

The data model matches one service to one or more forms and documents. Forms can be input documents or output documents. An example for the former one are applications forms. Examples for the latter one are notices or output documents of other services such as passports.



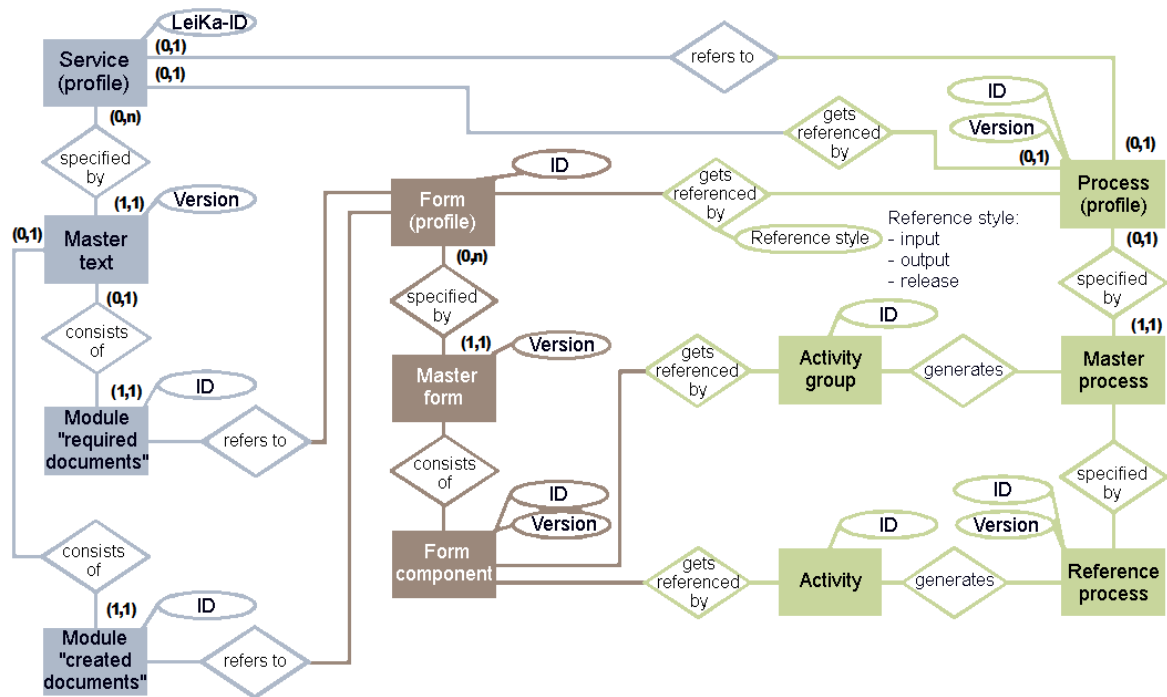
The Entity **Object Document** designates administration external documents such as blueprints or pictures. They are used as an information carrier too in the context of administrative services.

The matching between service and form or document is realized by means of the IDs: the LeiKa ID, form ID and document ID<sup>26</sup>. Similarly, a service or the respective forms and documents are matched to the corresponding process by means the process ID. The relationships shown below apply to both the top level of information (Master-Information) as well as the instantiations at the execution level.

The data model has continuously been refined according to the three stages of development. In the third stage, the relationships between the elements are described (form field and activity (= process step), cf. Figure 14). In a specific form, the content of form field and form field groups can be linked, which are described by rules (e.g. field selection rules, linkage rules, plausibility and consistency rules, structural rules, building regulations or subject-specific rules).

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<sup>26</sup> For clarity, the illustration of the object document is omitted in the graphical representation.



**Figure 14:** FIM data model in the third stage

Several activities form an activity bundle. Form fields and activities are identified by and associated with IDs. Similar to the matching between activity bundles and form field groups, the matching between activities and form fields take place in the context of a specific form.

## 6.5 Effects of a Federal Information Management

In order to evaluate the benefits of FIM elements, it has proven helpful to develop application scenarios.

Assuming that standardization is enhancing benefit potentials of FIM, the latter ones are achieved through less effort for editorial tasks such as creating and editing services descriptions, master forms, documents and reference processes. The improved efficiency is especially useful when new laws are adopted or existing ones are changed.

In both cases, the adoption of new laws or the amendment of existing ones, the adaption of the requirements can apply to specific services (and thus forms and processes) or apply to a large number of services as in the case of the E-Government Act<sup>27</sup>.

The scenarios resulting from the conclusions above are depicted in Tab. 5.

**Tab. 5:** Benefit Scenarios

	New Law	Law Amendment
Specific Services Provision	Scenario 1	Scenario 2
Multiple Services Provision	Scenario 3	Scenario 4

Scenario 1: A new law is adopted that influences one or few specific new services (and thus forms and processes). For the provision of the corresponding services, new descriptions of services, master forms, documents and reference processes have to be developed. One example of such a law is the introduction of the compulsory registration of existing gun licenses in the passport<sup>28</sup>.

Scenario 2: In case of a change in the law with a specific service provision, there are already one or more service descriptions, stem forms, documents and reference processes. These service descriptions have to be verified with regard to the changed law and need to be adapted if necessary. An example is the increase of the minimum age for obtaining a gun license.

Scenario 3 / Scenario 4: A new law is adopted or an existing one changed, which concerns many services (and thus forms and processes) such as the e-government act. The affected

<sup>27</sup> [http://www.bmi.bund.de/DE/Themen/IT-Netzpolitik/E-Government/E-Government-Gesetz/e-government-gesetz\\_node.html](http://www.bmi.bund.de/DE/Themen/IT-Netzpolitik/E-Government/E-Government-Gesetz/e-government-gesetz_node.html); accessed on September 29, 2013, 09:23

<sup>28</sup> Only fictitious examples are used in the scenarios.

services have to be identified to adapt correspondingly the services descriptions, stem forms, documents and reference processes.

The potential benefits that arise in the various stages of development through the interaction of the FIM components are described below by way of example for the stage 1 and Scenario 1 and for stage 3 and scenario 4.

*Stage 1 - Scenario 1 (specific service provision / new law):*

For the development of FIM information during or after the adoption of a new law, process descriptions (such as approval processes) serve as a reference point. Additionally, service descriptions and master forms of the same information domain can be used to create new service descriptions, stem forms and documents according to harmonization requirements. Similar service descriptions may indicate typically used invariant documents.

*Stage 3 - Scenario 4 (multiple service provision / amended law):*

Requirements for activity bundles or activities (e.g. verification of applicants' identity) or form field groups or form fields (e.g. legally binding signature) or the rules between form fields and field groups have usually to be adapted due to amended laws.

These new requirements can be easily detected for a specific service through the linkage of FIM logic across the different FIM components. Further, the cross reference of used FIM components allows to easily identify the form field groups, the form fields, the rules, the activity bundles and activities which have to be adapted due to the amended law.

## **6.6 Discussion**

This contribution shows that the interaction between data or information and business processes is not only relevant for the private sector but also for the public sector. While concepts for the business process management in the private sector are largely agreed upon, these concepts for the public administration are just about to emerge and not yet

tested. Although there are appropriate modeling techniques to model processes and information objects and to associate them to each other [vgl.112], their (across federal level and the federal state level) use in the public sector is still in its infancy [4]. It is shown that the understanding of the specific information requirements in certain parts of the process, contributes to improve information logistics.

The multiple use of different types of information on the various administrative levels and in different functional contexts makes the effect of a standardization of data definitions evident.

This effect is enhanced when the relationships between the components of a FIM are taken into account. The identified third stage corresponds to the maturity level of the private sector for entire industries [vgl. 116]: universally valid examples are defined, guidelines for data models, process models, organizational models and other models are given.

## **6.7 Conclusion**

The aim of this chapter is to present the content and especially the relationship between the components of a FIM. To this end, the FIM-contents were briefly introduced and a model of three stages developed, which describes the different level of interaction between the single components. Until now, this approach has not been sufficiently anchored in the practice of public administration. Although the potential benefits are recognized, the specifics of the federal administrative organizations inhibit their effectiveness.

In addition to the issues identified in this chapter potential benefits far differentiated potentials could be identified. A more detailed description and an approach for the fastest possible use remains subject to future research.



## 7. Conclusion

For the dissertation at hand, we described the essential design components of a platform, which promotes the exchange of business processes across administrative borders, and which makes locally available expertise of employees available and reusable for other administrative organizations. Further, we investigated which conditions exist and which are necessary for the implementation of BPM in the public administration and to promote the exchange of process knowledge. We then investigated the necessary linkage of processes with general service descriptions and forms and presented an appropriate solution. The findings can be summarized as follows:

- *Platform (Chapter 3)*: We examined which functions and which type of content should be included in the NPL platform in order to facilitate the implementation of BPM in the public administration. The functions have been evaluated by means of a quantitative survey. The survey confirmed that the NPL closes the gap between knowledge management and process management because it responds to the requirements and needs of the domain public administration. However, further research concerning the practical use and the resulting benefits (e.g. the impact on the quality of process models, the knowledge about BPM of employees in the administrations) for the public administration is necessary. Further, we presented various revenue models in order to ensure the continuity of the platform after the end of the project. The models take into account the limited resources of public administrations and aim to minimize the financial burden.
- *Comparison of success factors for the BPM implementation in public administrations across different countries (Chapter 4)*: We compared the approaches for BPM implementation in Germany, Austria and Switzerland based on common criteria. Currently, political backing is one of the main factors for BPM success. However, it remains unclear which BPM approach will be the most successful one in the long run. A second success factor we identified in our research is the partnerships among administration authorities. A platform offering social network components can

effectively support such partnerships. Until now, only few researchers address BPM in the public administration. Although our findings are not generalizable, they are providing first insights for research and practice towards an understanding of BPM in the public administration. Current developments and the determination of influencing factors will remain subject to further research.

- *Development of a framework for sharing process knowledge (Chapter 5):* The willingness to share process knowledge is limited, especially in public administrations. We showed which circumstances, drivers and inhibitors influence the exchange of process knowledge in the public administrations. Our analysis of the transcribed interviews was based on the research methodology Grounded Theory and resulted in a conceptual framework. The framework shows the relevant conditions, the inhibitors and the drivers influencing the willingness to share process knowledge. Interestingly, we identified factors inhibiting the willingness to share process knowledge that are specific to the public administration. Therefore, specific measures need to be identified to overcome them. In particular, existing drivers should be used to push the identified needs “to compete” and “to compare”. We will evaluate our findings in a quantitative study and we will identify which factors influence the willingness to share process knowledge in and between organizations, and to what extent.
- *Federal Information Management (Chapter 6):* Conception for linking process information with general service specifications (complete overview of services of the German public administration) and form data as main input and processing variable in processes. We investigated how to combine and to integrate data and information from the areas of services, processes and forms of public administrations. We identify the essential correlations and their effects on administrative action. We also present different levels of details and different levels of maturity of FIM implementation. The potential benefits of FIM identified in this chapter should be further evaluated and complemented in further research as well as success factors for the implementation of BPM in public administration.





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## **8. Appendix**

### **8.1 Appendix for Chapter 3**

#### **8.1.1 Regulatory Framework NPL**

(Stand August 2011)

If gender-specific designations are used, both sexes are meant. For reasons of simplification, the feminine form is omitted.

#### **Introduction**

For the storage and retrieval of process models, information and documents in the “National Process Library” (NPL), a uniform logical structure (regulatory framework) is required.

Different order models from current administrations were analyzed to determine the framework, especially the order models of partners of the research project. These include LeiKa 2.0, KDV process register North Rhine-Westphalia, DIN Technical Report 158, the process catalogue of Saxony and the regulatory framework of the KGSt.

The partners of the research project have agreed upon the following regulatory framework in a meeting on August 7th, 2011. This framework will be further specified regarding the user requirements in the course of the project by means of qualitative and quantitative studies.

#### **Classification of attributes**

The processes of the NPL can be classified into the following subgroups:

**Identifying Attributes:** They allow the unambiguous identification of the stored processes. In the NPL, this identification is realized by means of the LeiKa ID. Municipal

processes can be identified by means of a service number listed in the KGSt product catalog.

**Structuring Attributes:** These attributes embed the processes into a hierarchical tree structure. Users can use this structure to search for specific processes. More specifically, the user can choose among processes of different administrative levels and processes of different administrations. The KGSt product catalogue is hierarchically structured and used in the municipalities.

**Classifying attributes:** They allow targeted searches for processes outside the specified structure. Based on the attributes of the processes, they are assigned to relevant subsets. The attributes can be interpreted as a simplified search filter to narrow down the search results to the relevant processes.

**Descriptive attributes:** These attributes contain further information, which are not assigned to predefined categories. An example are free text fields, which result in an unlimited number of possible answers. Therefore, these attributes cannot be taken into account when searching. However, there is the possibility to use the meta data to search for specific processes such as the name of a contact person.

### Representation of the attributes

The following table depicts all attributes and their respective categories. In addition, it indicates whether the user has to maintain the attribute voluntarily or mandatory or if the attribute is automatically generated from other data sources.

**Tab. 6:** Regulatory Framework NPL

Name	Instantiation	Type of attribute
<b>Identifying attributes</b>		
Service object of LeiKa ID	Confer also to LeiKaPlus manual: LeiKa ID without country code until instance, service grouping and service identification (e.g. 99001001)	Mandatory

<b>Name</b>	<b>Instantiation</b>	<b>Type of attribute</b>
KGSt number (KGSt product catalogue)	The goal is the widespread usage of the KGSt product catalogue. The KGSt is currently (as of April 2011) converting the catalogue; therefore, its integration has to be postponed.	Voluntary
<b>Identifying attributes</b>		
Levels of administrative organizations	Federal level, state level and municipal level: Regional keys are used as far as possible, which are proposed based on the responsible organizational unit.	Automatic
Topic areas	Selection list: foreign affairs; labor; education, family; finance; research; women; health; integration; internal affairs; justice; social welfare; urban development; technology; environment; consumer protection; transport; defense; economy; research; internal administration; security and order; school; culture; social assistance; child, youth and family welfare; health; sports; urban development; construction and housing, utilities and waste disposal, public transport, nature and landscape conservation, environmental protection, economy and tourism, and other (free text field) - multiple selection is possible	Mandatory
<b>Classifying attributes (allows search for processes)</b>		
LeiKa service name	Taken from LeiKa	Automatic
KGSt service name	Taken from KGSt (if available)	Automatic
Process name	Free text field (with dynamic completion)	Automatic
Legal basis	Taken from LeiKa	Automatic
Further relevant legal standards	Free text field (addition to attribute „legal basis“)	Voluntary
Status of process	Local as-is-process Inter-organizational agreed upon as-is-process Inter-organizational agreed upon to-be-process Visionary process	Mandatory
Method of modeling	Selection list BPMN EPC, eEPC	Mandatory

<b>Name</b>	<b>Instantiation</b>	<b>Type of attribute</b>
	Picture FaMoS UML Other (free text field)	
Modeling tool and version	Only possible if original data is uploaded.	Automatic / voluntary
Type of process	Supporting process Core process Leading process	Mandatory
Size of administrative unit	Size range of municipal administrative units (number of inhabitants). Can alternatively be taken from the municipal registry. Over 400.000 200.000 – 400.000 100.000 – 200.000 50.000 – 100.000 25.000 – 50.000 10.000 – 25.000	Automatic
Degree of electronic support	Multiple choice: No support Information Download of forms E-form can be send, if necessary with signature Interaction completely electronic	Voluntary
E-government component	Multiple choice: Form service Digitalization of records E-payment E-signature E-archive DMS GIS Workflow Management Systems Registry service	Voluntary

Name	Instantiation	Type of attribute
	Mobile services	
Service Receiver	Multiple choice: Government (G2G) Citizens (G2C) Businesses (G2B) Other	Mandatory
<b>Descriptive Attributes (provide additional information)</b>		
Description	Free text field	Mandatory
Contact point	Structured free text field (last name, first name, title, position, department, phone number, e-mail)	Voluntary
Responsible organizational unit	Several free text fields (title, street, postal code, city, Internet address)	Mandatory
Number of cases per year	Numerical field: Until 100 Until 500 Until 1.000 Until 5.000 Until 10.000 Over 10.000 Free text field for comments	Voluntary
Lead time	Field with time format Free text field for comments	Voluntary
LeiKa processing Time	Field with time format Stored text in the LeiKa module 12 “processing time”	Automatic
Costs per process	Numerical, free text field for comments	Voluntary
LeiKa costs	Stored text in the LeiKa module 10 “costs”	Automatic
Link	link to other processes and free text field	Voluntary
Date of entry	Date	Automatic

In the following, the attributes depicted above will be described:

**LeiKa ID:** The services catalog of the public administration (LeiKa) is a consistent and comprehensive registry of administrative services of federal, state and municipal



administrations. The LeiKa allows the standardization of services of the public administration by means of consistent encoding and names and therefore enables an unambiguous identification of administrative services.

**Tab. 7:** Structure of LeiKa

<b>LeiKa-ID</b>				
Instance	Leistungs- gruppierung (LG)	Leistungs-kennung (LK)	Verrichtungs- kennung (VK)	Verrichtungs-detail (VD)
Standardized Adressrang for central use				
99	001-899	001-899	001-899	001-899
Free Adressrange for decentral use				
00-16	900-999	900-999	900-999	900-999

**KGSt Product catalogue:** The KGSt is an association for municipal management, which is organized by cities, communities and municipalities. The KGSt product catalogue is used as a structuring framework due to its widespread distribution. The LeiKa ID is linked (mapping) to the KGSt product catalogue.

**Levels of administrative organization:** This attribute determines whether a process describes the federal level, state level or municipal level. The attribute is automatically derived from the contact point and the responsible organizational unit.

**Topics:** The assignment to a specific department / topic area is problematic as these are often composed differently. Therefore, the selection of several terms is possible. The selection of topic has been complemented to the product surface areas of the KGSt product catalogue. The list of topics has been extended by the product areas of the KGSt product catalogue.

**LeiKa service name:** The service name is automatically transferred from the LeiKa. This attribute cannot be changed.

**KGSt service name:** The name service is automatically transferred from the KGSt. This attribute cannot be changed. If the user wished to rename a process, he may do so (see below).

**Status of the process:** This information enables conclusions about the degree of coordination and the quality of the uploaded process. The choices are based on the KGSt, but were slightly extended.

**Name of the process:** The name of the process is inserted into the system by means of a free text field. The system automatically completes the search term inserted by the user in order to support the consistent use of terminology.

**Legal basis:** The legal basis is a required field of the 7<sup>th</sup> module of LeiKaPlus. It is a central search attribute, which is automatically transferred from LeiKa. However, the information in LeiKa only concerns the federal level. Therefore, the legal basis needs to be extended in order to include also the state level and the municipal level.

**Other relevant rules of law:** If further rules of law are significant for a process, the user can add these to the legal basis taken from LeiKa.

**Modeling methodology:** The modeling method is the notation for the representation of processes. The popular notations BPMN, EPC (eEPC), Picture, FaMoS, UML are specified by list selection. Alternatively, other modeling notations can be specified by means of a free text field.

**Modeling tool and version:** If original data is uploaded, information about the used modeling notation and its version are required. This way, a user can determine whether he can use the model. In the course of the project, it will be investigated whether this information can automatically be generated.

**Process Type:** There are three project types: supporting processes, core or business processes and leading processes.

**Task Type:** This attribute is defined by a list with the following options: “voluntary task”, “mandatory task” and “single order”.

**Size of the administrative unit:** the six size classes of KGSt for municipal administrations specify the size of an administrative unit. These classes are based on population figures. This attribute is only applicable for processes concerning municipal administrations.

**Degree of electronic support:** The degree of electronic support is determined by means of the EU e-government maturity model. There are several predefined maturity levels: “no support”, “information”, “form download”, “e-form can be sent, if necessary with e-signature”, “fully electronic interaction” (submission of applications, processing, sending of the administrative decision including the payment processing).

**E-government component:** This attribute specifies the degree of electronic support. It was transferred from the KGSt process description.

**Service receiver:** The service receiver is the customer of the ordered service. Services can be delivered to administrations (Government to Government - G2G), to citizens (Government to Citizen – G2C), to businesses (Government to Business - G2B), as well as to other external legal entities. Theoretically, it is possible that contracting entities and service receiving entities are not identical. In the course of the following qualitative and quantitative studies, it will be evaluated whether a distinction between contracting entities and service receiving entities is necessary.

**Description:** The description of the process is inserted into a free text field. There is intentionally no information about the desired level of detail given in order not to restrict the user.

**Contact point:** This is the name of a contact person who can be contacted in case of questions or suggestions. It is a structured free text field with name and address of the contact person.

**Responsible organizational unit:** The responsible organizational unit enables the contact to the parties involved in a process in case the contact person leaves the organizational unit.

**Number of cases per year:** The number of cases per year provides information about how often the process is carried out. The predefined choices are transferred from the KGSt process description. Additionally, a free text field is provided to insert additional comments.

**Lead times:** The lead times record the average time it takes from triggering the process until the process result. The lead times are inserted by means of a free text field.

**LeiKa Processing Time:** In the LeiKa module 12 "processing time" certain lead times are stored. Based on this information, the Federal Printing Office can draw conclusions about the lead times. The LeiKa Processing Time is automatically transferred and is not associated with additional effort for the user. The usefulness of this attribute will be investigated in the course of the project.

**Cost per year:** The average costs are also provided via a free text field. Additional explanatory information can be detained such as information about the payment method.

**LeiKa costs:** The LeiKa module 10 "costs" lists charges. The information is automatically transferred and is not associated with additional effort for the user. The usefulness will be investigated in the course of the project.

**Link:** This attribute allows inserting additional links to refer to other content.

**Date of Entry:** The date is automatically saved when an entry in the NPB is created.

### **8.1.2 XProcess specification (excerpt)**

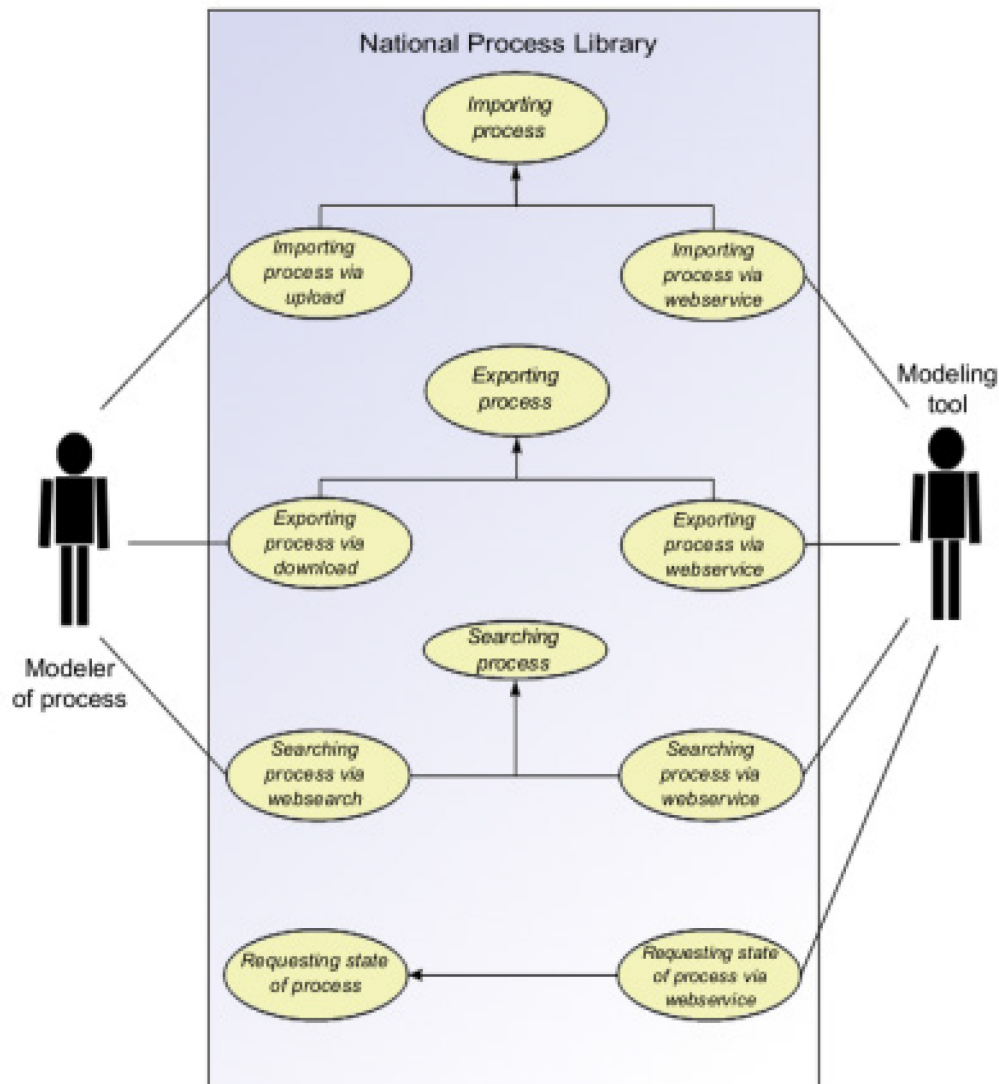
The specification of the developed exchange standard XProcess meets the requirements of the standard setting body XÖV. In the following, an excerpt from the developed specification will be presented, which illustrates the importance to link the process (management) platforms with each other. The complete specification was submitted to KoSIT<sup>29</sup>.

#### **„Interaction with the National Process Library“**

The interface XProcess will enable the direct import and export of a process. The import or export consists of a process model in a uniform and standardizes XÖV-compliant XML format (XProcess XML file). The files should be transferable via a web service or a browser. The Figure 15 describes these applications.

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<sup>29</sup> <http://www.xoev.de/sixcms/detail.php?gsid=bremen02.c.730.de>; accessed on 21.10.2013 09:54



**Figure 15:** use case diagram Interaction with the NPL

A user should be able to publish process models in the NPL, which he modelled with his modelling tool. Similarly, he should be able to import process models as XProcess XML files from the NPL into his modelling tool. A user can only edit the metadata of a process model in the NPL or he can add edited process model diagrams to a process. He has to import the process model diagram into his modelling tool in order to edit it. He can then import the edited version of the process model into the NPL as an XProcess XML file. The use case diagram (Figure 15) depicts the two possibilities of performing the export or

import of a process model and its metadata into the NPL. The import and export via web service require further interaction with the NPL such as searching for processes or the status of a process. These applications are also depicted in the use case diagram (Figure 15). The use of the Xprocess standard for the exchange of processes between the NPL, the process modelling tool or process repositories will facilitate the usage of the NPL as the user is no longer required to enter the metadata and the corresponding process model files into the NPL or into his own process modelling tool.

## **8.2 Appendix for Chapter 5 - Extract from the questionnaire**

### **Topic: Business Process Management**

*Knowledge and acceptance of notations and tools:*

- Which notations / tools do you know / do you know?
- What do you think is important for the success / failure of a notation / a tool?

*BPM in your administrative unit:*

- Which BPM activities are taking place in your administrative unit?
- Are processes documented, analyzed, optimized and monitored?
- What are the goals?
- In which areas / organizational units is BPM used?
- How many employees / task forces are involved? What are their tasks?
- How is the knowledge of the employees?
- Are employee trainings planned?

### **Topic: BPM communities and their forms of communication**

*Use of Web 2.0 communication forms:*

- Do employees of your administrative unit use different forms of internet communication (blogs, forums, chat rooms etc.)?
- What are inhibitors?
- Which forms of communication are used?
- Which devices (laptop, PC, smart phone etc.) are used for these forms of communication?
- How would you estimate the degree of activity in social networks and forums?
- Which challenges and risks can you identify?



- What are the barriers and limits?

*PC equipment and IT-affinity of employees:*

- How many employees are equipped with a PC?
- Is there an intranet? An internet?
- Which monitors are used?
- Are there any employees with visual impairment?
- What is the average age of all employees?

### **Topic: Research Project National Process Library**

*Regulatory framework:*

- Which information do you need and which information would you like to access?
- Do these information exist in the NPL? How can these be obtained?
- Can you identify any problems accessing this information? How?

*Project-specific:*

- What are your expectations concerning the NPL project?
- Which barriers or obstacles can you identify?
- Which conditions have to be established in order to solve these problems?

*Community-based:*

- What do you think about the participation of the employees in the process development?
- What do you think about the participation of employees in the Web 2.0 (Internet, Community)?

- What is the opinion of the head of agency?
- Which limitations exist in your administrative unit?

## **Selbständigkeitserklärung**

Hiermit erkläre ich, die vorliegende Arbeit selbstständig ohne fremde Hilfe verfasst und nur die angegebene Literatur und die angegebenen Hilfsmittel verwendet zu haben.

Ich bezeuge durch meine Unterschrift, dass meine Angaben über die bei der Abfassung meiner Dissertation benutzten Hilfsmittel, über die mir zuteil gewordene Hilfe sowie über frühere Begutachtungen meiner Dissertation in jeder Hinsicht der Wahrheit entsprechen.

Potsdam, 11. Februar 2014

Norbert Ahrend